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Cover: Our cover illustration for 2013 shows a species of the pebble-mimicking genus *Raniliella* (Orthoptera: Acrididae). There are two species in the genus, both restricted to desert environments of the northern parts of South Australia. They are commonly seen in stony areas around the Flinders Ranges. *Raniliella* is one of several genera of Australian grasshoppers which closely resemble the stones of our extensive gibber deserts. The illustration is reproduced by permission from CSIRO's *Insects of Australia* and is by the late Frank Nanninga, a Dutch-born artist who was the leading insect illustrator of the 1960s in Australia. His work reached its peak in the eight magnificent colour plates which grace the pages of *Insects of Australia.*

NOTES ON THE ECOLOGY, PHENOLOGY AND DISTRIBUTION OF *POLLANISUS CYANOTUS* (MEYRICK, 1886) (LEPIDOPTERA: ZYGAENIDAE: PROCRIDINAE: ARTONINI)

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Abstract

New information is presented on the ecology and phenology of the zygaenid moth *Pollanisus cyanotus* (Meyrick, 1886). The known distribution of the species is extended to a site in the Baranduda ranges of northeastern Victoria. The previously unknown larva is described, with *Hibbertia obtusifolia* DC (Dilleniaceae) and *Hibbertia riparia* (R.Br. ex DC.) Hoogland (Dilleniaceae) recorded as larval food plants. A dipteran parasitoid is also noted. Observations are made in relation to adult behaviour and morphology.

Introduction

A population of *Pollanisus cyanotus* (Meyrick, 1886) was recently discovered by the author in northeastern Victoria. Initially, a series of adults was found (December 2010), followed by mature larvae on *Hibbertia obtusifolia* DC (Dilleniaceae) in February 2011. The site is at 380 m elevation, thinly forested with red stringybark (*Eucalyptus macrorhyncha* (F.Muell. ex Benth)) and a rocky understorey of mixed shrubs. Subsequently, during late autumn and early winter 2011, second instar larvae were found on *Hibbertia riparia* (R.Br. ex DC). In August and September 2011, both second and third instar larvae were found, followed in late October by larvae approaching maturity. While *Pollanisus* Walker spp. are notoriously difficult to identify, *P. cyanotus* is the only known Australian species in the genus in which the female abdominal tuft is grey; in all other known Australian species the tuft is yellow. Its identity was further confirmed by dissection of both male and female genitalia and comparison with the images and descriptions in Tarmann (2004). In the female, the 'tentacles' described by Tarmann are very evident.

Pollanisus cyanotus is known primarily from locations in southern New South Wales, mainly from sites in the Sydney-Wollongong area, often coastal but also up to about 50 km inland. There are two records from southern Queensland, also from coastal regions. The only truly inland record is a specimen from 'Innaminna', which is assumed to be from a property of that name some 100 km NW of Dubbo, NSW. Until recently, *P. cyanotus* was known in Victoria only from two specimens, collected near Cann River and Hazelwood respectively. (All preceding distribution records are derived from Tarmann 2004). Recently, A. Kallies (pers. comm.) discovered a population of *P. cyanotus* near Malacoota, East Gippsland, where it was found in a coastal heath swamp. Here the population was associated with a small species of an unidentified *Hibbertia*; however, no direct proof was obtained that this was indeed the host plant. The current observations from NE Victoria

represent a significant extension of the range of *P. cyanotus* in Victoria and the first host plant record. They also show a much wider habitat preference for this species than anticipated.

Methods

Observations of adults and larvae were made on private property approximately 5 km north of Yackandandah, Victoria (36°17.058S, 14°652.553E). Larvae were preserved first in KAA – Kerosene, Ethyl alcohol and glacial Acetic acid, then in 70% ethyl alcohol, following the method described by Tarmann (2004). A female, reared from larvae collected in February, emerged in March and was paired by assembling at the site; larvae from eggs she laid were reared in captivity. Genitalia dissection was as per Common (1990). Larval collection was most easily carried out by placing a net or sheet underneath the larval food plant which was then shaken.

Material examined

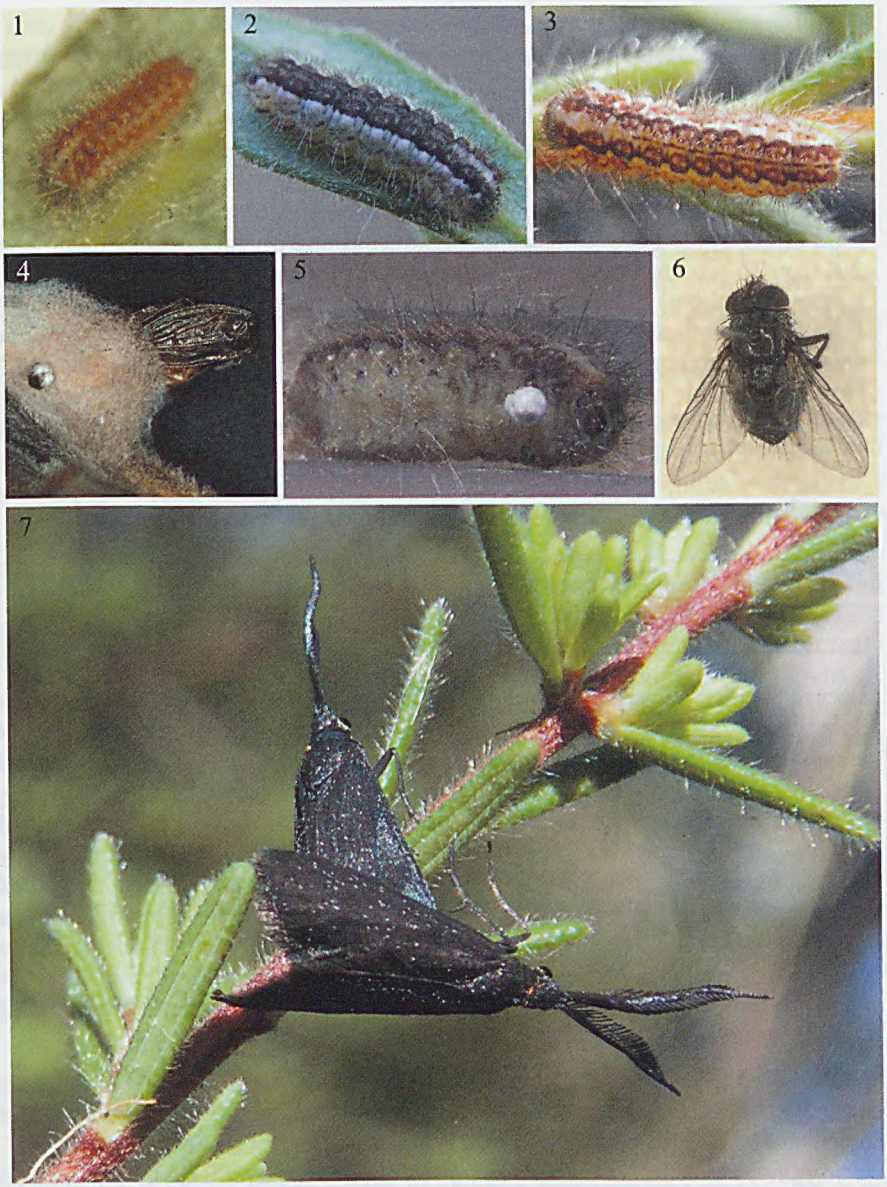
All from Baranduda ranges, north of Yackandandah, NE Victoria: immature and mature larvae (more than 50 found, 10 preserved) and adults (approximately 20 male and 3 female wild-caught specimens, approximately 10 of each gender retained from reared specimens); eggs obtained from a bred female; cocoons from larvae found in February 2011 and captive reared; microscope slides of male and female genitalia. All material is in the collection of the author.

Larval description

Mature larva: Length 10-10.5 mm. Verrucae (V) on all segments in three bands: Dorsal (D), Sub-Dorsal (SD) and Lateral (L). DV ringed with dark brown or black, SDV sometimes fully ringed, sometimes only partially ringed ventrally with dark brown; line between DV and SDV white, line ventrad of SDV white or light brown, dorsal area between two rows of DV white with interrupted dark brown mid-dorsal line on A1-8 and thoracic segment 3 but absent on thoracic segments 1 and 2, giving the appearance of the thorax bearing a pronounced white patch; LV ringed with dark purple-brown; venter translucent white; A9 on line between DV and SDV carries a small white protuberance, function unknown but similar in appearance to the white silk bead attaching to the cocoon. Figs 2-3 show two larval colour forms. The appearance of the white thorax is recognizable in all stages of larval development (Fig. 1 shows a second instar larva).

Adult morphology

The wings of freshly emerged adults are dusted with white scales. These markings are asymmetrical and the positioning of the white scales differed between each of the adults examined. The hind wing of the freshly emerged adult is sometimes green tinged, but this was not noticed in any wild caught specimens, which instead had a transparent, thinly scaled appearance. A pair of adults mating, resting on *H. riparia*, is shown in Fig. 7.



Figs 1-7. *Pollanisus cyanotus* and its parasitoid. (1) second instar larva of *P. cyanotus* showing the white thoracic colouration; (2-3) two colour forms of mature larvae of *P. cyanotus*; (4) cocoon of *P. cyanotus* with pupal exuviae, illustrating the partial darkening of the silk bead; (5) larva of *P. cyanotus* in early stage of cocoon construction showing bead placement; (6) tachinid fly parasitoid of *P. cyanotus*; (7) pair of *P. cyanotus* mating, at rest on *H. riparia*.

Phenology and ecology

In situ observations. Adults were initially seen on 12 December 2010, followed by the discovery of mature larvae on *H. obtusifolia* on 29 January, then on 3, 5 and 9 February 2011. The species is bivoltine at this location, with adults on the wing in late spring to early summer and again in March (the latest observed being 2 April). An adult male was observed feeding at flowers of *Monotoca scoparia* (Sm.) R.Br. (Ericaceae) (prickly broom-heath) on 2 April 2011. Second instar larvae were found on four occasions in May 2011 on *H. riparia* brought in to feed captive larvae. Second and third instar larvae were found in late August and early September 2011 on *H. riparia*; of three larvae found on 7 September 2011, two were 3 mm in length and one was just under 2 mm. All three were found on the underside of sepals. On 3 November 2011, mature larvae were commonly found on *H. riparia*. Adults were then seen on 28 and 29 November and in early December 2011. The complete annual lifecycle at this site is described in the following timeline, where A = adult, O = ova, L = larva, P = pupa; red text represents *in situ* observations and black text represents deductions:

O/L	L/P	P/A/O/L	A/O/L	L	L	L	L	L	L/P	P/A	A/O
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Larvae located by searching were most easily found at dusk or soon after dark. However, they could also be found during the day on the underside of leaves and on the upperside where the plant was in a shaded or semi-shaded position. When moved into full sunlight for photography, they quickly retreated to the underside of the leaf. Feeding on *H. obtusifolia*, larvae grazed the top surface of the leaf, leaving the under surface of the leaf almost fully transparent. During late February, after mature larvae reared in captivity had all pupated, individual plants of *H. obtusifolia* on which many wild larvae had been observed were thoroughly searched, together with surrounds, to a radius of approximately 1 m; however, no cocoons could be found. From larvae found in February 2011, the mean time between commencement of cocoon construction to emergence of the adult was 18 days.

Captive rearing. In captivity, a fertile female provided with *H. obtusifolia* laid eggs on the underside of the leaf. As with other species of *Pollanisus*, the eggs were covered with the female's abdominal setae (pers. obs. – *P. viridipulverulenta*, *P. cupreus*, *P. apicalis*; Tarmann 2004). Larvae reared from the egg were at all times offered both species of *Hibbertia* present at the site and selected exclusively *H. riparia*. Eggs laid on 6 March hatched on 13 March and larvae matured quickly in captivity, with pupation commencing between 27 May and 19 June – a total development time of 75-97 days. In captivity, the mature larvae prior to pupation spent more than 24 hours wandering around the breeding container prior to locating a suitable pupation

site, which was generally in a crevice on the under surface of the lid of the container. It appears likely, from the combined observations both in the wild and in captivity, that mature larvae move some distance from the food plant prior to forming a cocoon. Adults emerged from late June to late July.

Cocoon construction. The cocoon of *P. cyanotus* is white and carries at least one small bead of tightly woven silk on the outer case (Fig. 4). Similar structures have been observed on the cocoons of other *Pollanisus* species (Mollet and Tarmann 2010). However, this does not seem to be present in *P. viridipulverulenta* Guérin-Méneville, 1839 (pers. obs.). In some cases there was one main bead and several smaller silken nodules. When freshly spun, the entire bead is white; after a short period a portion of the bead assumes a dark brown or black colour. The function of the bead is not known.

Cocoon construction itself commences with the larva laying down a simple structure comprising very few single strands, then producing the silk bead and placing this on what will become the outside of the cocoon before finally completing the structure, thereby leaving the ball of silk on the outside of the cocoon (Fig. 5).

Adult behaviour. In March 2011, adult behaviour was closely observed and males were seen to fly freely in semi-shaded areas among the two larval food plants on site, *H. obtusifolia* and *H. riparia*, with the latter plant significantly preferred. Flight time was between early and late afternoon (*ca* 1800h). A female collected on 12 December 2010 was the only one observed in the 2010-2011 flight seasons. This was despite the fact that the species was known to be present at the site and the frequent visits made in March 2011.

In the following Spring–Summer season, 2 females were taken feeding at *Bursaria spinosa* (Cav.) on 29 December 2011, at the end of the first 2011-2012 adult brood. On 14 March 2012, visiting the site with A. Kallies, six females and eight males were taken in the late morning. Flight was generally close to the ground and males were rarely seen individually; 3 to 6 specimens were often seen flying in close proximity, exhibiting what appeared to be assembling behaviour (although no females could be located at the time).

On 5 March 2011, a freshly emerged female bred from a larva found in February was taken to the site around 1600h and used to attract males. This proved very effective, with more than 40 males coming to the female in the period between 1600h and 1700h at five different sites some 20 m apart.

Parasitoids. Of 14 larvae found in January and February 2011, two were parasitized by a tachinid fly (Diptera: Tachinidae) (Fig. 6), with a single adult tachinid emerging from each of the pupae. From pupae reared from eggs laid in captivity and reared on *H. riparia*, two further examples of the same parasitoid species emerged in early August 2011. It is likely that infection occurs by micro-oviparity, where eggs of the tachinid are deposited on the leaves of the food plant and subsequently ingested by the host.

It has not been possible to identify the tachinid to species or genus level; however it is likely to be a genus near *Austronilea* Crosskey in the tribe Eryciini (B. Cantrell pers. comm.).

Acknowledgements

I am most grateful to Bryan Cantrell (Queensland Museum, Brisbane) for examining the tachinid flies and providing information in relation to their likely tribe and genus. Also to Prof Dr Gerhard M. Tarmann for his review of and comments on a draft of this manuscript.

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SOME NEW AND INTERESTING BUTTERFLY (LEPIDOPTERA) DISTRIBUTION AND TEMPORAL RECORDS FROM QUEENSLAND AND NORTHERN AUSTRALIA

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Abstract

Taractrocera anisomorpha (Lower, 1911), *Papilio fuscus canopus* Westwood, 1842 and *Hypolimnas missipus* (Linnaeus, 1764) are newly recorded from the Kimberley region, northern Western Australia; *Danaus genutia alexis* (Waterhouse & Lyell, 1914) is newly recorded from Darwin, Northern Territory; *Catopsila pyranthe crokera* (W.S. Macleay, 1826) and *Hypolimnas alimena lamina* (Linnaeus, 1758) are newly recorded from Cape York Peninsula, Queensland; *Parnara bada sida* (Waterhouse, 1934) and *Pelopidas agna dingo* (Moore, 1866) are newly recorded from Blackdown Tableland, central-eastern Queensland. Nine new temporal records filling gaps in the current adult butterfly phenology from Australia are also provided for *Rachelia extrusa* (C. & R. Felder, 1867), *Papilio aegeus aegeus* Donovan, 1805, *Elodina parthia* (Hewitson, 1853), *Leptosia nina* (Fabricius, 1793), *Libythea geoffroy genia* Waterhouse, 1938, *Danaus genutia alexis* (Waterhouse & Lyell, 1914), *Nesolycaena caesia* d'Apice & Miller, 1992, *Jamides amarauge* Druce, 1891 and *Pithecops dionisius dionisius* (Boisduval, 1832).

Introduction

Since 1996, the authors have undertaken numerous field trips across northern Australia, from the Kimberley region of northern WA to Cape York Peninsula, Qld (including the islands of the Torres Strait) and the Blackdown Tableland of central-eastern Qld. The data presented below are based on detailed observations made during these field trips and compared with the locality distribution and temporal records principally contained in Braby (2000) and papers by subsequent authors. These data are aimed at filling current gaps in published butterfly spatial distribution and temporal records.

Eight new significant spatial distribution records are presented in Table 1 for *Taractrocera anisomorpha* (Lower, 1911), *Papilio fuscus canopus* Westwood, 1842 and *Hypolimnas missipus* (Linnaeus, 1764) from the Kimberly region, northern WA; *Danaus genutia alexis* (Waterhouse & Lyell, 1914) from Darwin, NT; *Catopsila pyranthe crokera* (W.S. Macleay, 1826) and *Hypolimnas alimena lamina* (Linnaeus, 1758) from Cape York Peninsula, Qld; *Parnara bada sida* (Waterhouse, 1934) and *Pelopidas agna dingo* (Moore, 1866) from Blackdown Tableland in central-eastern Qld.

Nine new temporal records that fill gaps in current adult butterfly phenology data in Australia are presented in Table 2 for *Rachelia extrusa* (C. & R. Felder, 1867), *Papilio aegeus aegeus* Donovan, 1805, *Elodina parthia* (Hewitson, 1853), *Leptosia nina* (Fabricius, 1793), *Libythea geoffroy genia* Waterhouse, 1938, *Danaus genutia alexis* (Waterhouse & Lyell, 1914), *Nesolycaena caesia* d'Apice & Miller, 1992, *Jamides amarauge* Druce, 1891 and *Pithecops dionisius dionisius* (Boisduval, 1832).

Table 1. New butterfly distribution records from northern Western Australia (WA), the Northern Territory (NT) and northern and central-eastern Queensland (Qld).

Family / Species	Comments
HESPERIIDAE	
Taractrocera anisomorpha (Lower, 1911)	Not previously recorded north of the Gibb River Road, Kimberley region, northern WA. Williams *et al.* (2006) recorded it from the Great Northern Highway, 115 km south-east of Derby (17°50'S, 124°32'E), the Junction of the Great Northern Highway and Gibb River Road (15°50'S, 128°18'E) and eastwards to 2 km north of the Ord Dam (16°05'S, 128°45'E), in late March to early April 2003. We collected a single female from Ooraro Hill near Kalumburu (14°17'17.77"S, 126°40'3.42"E) on 1 April 1996. A single male was also collected adjacent to monsoon forest (vine-thicket) on the Mitchell Plateau (Site 2: 14°37'23.4"S, 125°48'30.64"E) on 1 November 2009.
Parnara bada sida (Waterhouse, 1934)	Not previously recorded from Blackdown Tableland, in central-eastern Qld. We collected two males, one during 19-22 September 2008 and the other on 24 September 2010, hill-topping on a ridge top north of Horseshoe Lookout on the Blackdown Tableland, 183 km west of Rockhampton. Both were newly emerged, suggesting that they had not travelled far and were likely to be resident in the area.
Pelopidas agna dingo (Moore, 1866)	Not previously recorded from Blackdown Tableland, in central-eastern Qld. We collected a single female feeding at *Leptospermum* sp. blossom on 29 September 2012 along the track to Two Mile Falls south of Horseshoe Lookout, Blackdown Tableland.
PAPILIONIDAE	
Papilio fuscus canopus Westwood, 1842	Not previously recorded from Kalumburu or the Mitchell Plateau, Kimberley region, northern WA. Grund and Hunt (2001) noted that the butterfly had been observed sporadically in the Kimberley by Grund during a previous trip in 1997, yet no mention of it was made in Grund (1998). Williams *et al.* (2006) recorded a specimen from Rocky Cove, Vansittart Bay (14°13'S, 126°52'E) collected in March 2004. We commonly encountered both sexes at Kalumburu and along the banks of creeks crossing the Kalumburu Road up to 15 km south of the Kalumburu township, during our initial visit to the area 28 March to 4 April 1996 and again during 24-27 March 2009.

Family / Species	Comments
	The butterfly was also commonly encountered in monsoon forest areas of the Mitchell Plateau in early November 2009.
PIERIDAE	
Catopsila pyranthe crokera (W.S. Macleay, 1826)	Not previously recorded from Cape York Peninsula, Qld. In early June 2006, the authors and Dr C.G. Miller encountered both sexes commonly at Bamaga, Lockerbie Scrub, Roma Flats, Pajinka and Somerset in northern Cape York Peninsula, extending the northern limit for the butterfly on mainland Australia from Kuranda to the tip of Cape York Peninsula.
NYMPHALIDAE	
Danaus genutia alexis (Waterhouse & Lyell, 1914)	Not previously recorded from Darwin, NT. Braby (2000) recorded it from the Darwin district. A single male was collected by one of us (SSB) at East Point coastal reserve, Darwin on 10 February 2007.
Hypolimnas missipus (Linnaeus, 1764)	Not previously recorded from Kalumburu, Kimberley region, northern WA. We collected a single female flying in a grassy area adjacent to the Kalumburu Mission on 24 March 2009.
Hypolimnas alimena lamina (Linnaeus, 1758)	Not previously recorded from the White Mountains, Cape York Peninsula, Qld. Atkins *et al.* (2003) noted an unconfirmed sighting of a female in one of the gorges of White Mountains National Park. We observed two males flying in the gorges north-east of the Old Warang Homestead, White Mountains National Park north-west of Torrens Creek, Qld during our visit to the area 8-10 November 2011.

Table 2. New butterfly temporal records.

Family / Species	Comments
HESPERIIDAE	
Rachelia extrusa (C. & R. Felder, 1867)	Not previously recorded in March or April. We observed numerous adults flying high on the canopy between 0700 and 0800h at the second crossing on Gordon Creek in the Iron Range Resources Area, Cape York Peninsula, Qld during the period 11-18 March 2011 and again in April 2012.
PAPILIONIDAE	
Papilio aegeus aegeus Donovan, 1805	Not previously recorded from the White Mountains, Cape York Peninsula, Qld in November. Atkins *et al.* (2003) recorded it from there during the study period 20 March to 19 April 2000 or during one of the many

Family / Species	Comments
	other visits that the authors made to the area in prior years during the months of January to May, September, October or December, although it is not clear in which month(s) the butterfly was recorded. We observed two males flying in the gorges north-east of the Old Warang Homestead, White Mountains National Park north-west of Torrens Creek, Qld during our visit to the area 8-10 November 2011.
PIERIDAE	
Elodina parthia (Hewitson, 1853)	Not previously recorded from the White Mountains in November. Atkins *et al.* (2003) recorded it there from records taken by S.J. Johnson and P.S. Valentine during visits made to the area in prior years during the months of January to April (including the study period) and December. We collected and observed it flying in the gorges north-east of the Old Warang Homestead, White Mountains National Park during our visit to the area 8-10 November 2011.
Leptosia nina (Fabricius, 1793)	Not previously recorded in July or November. On 1 November 2009, we collected five males from monsoon forest on the Mitchell Plateau, Kimberley region, northern WA (Site 2: 14°37'23.4"S, 125°48'30.64"E). Frank Pierce has photographic records of the butterfly taken during bird trips to the region in July 2007 (Site 1: 14°36'56"S, 125°47'53"E) and from the same site during another visit in June 2010.
NYMPHALIDAE	
Libythea geoffroy genia Waterhouse, 1938	Not previously recorded in April. We encountered both sexes feeding at blossom of a Fiddlewood tree (*Citharexylum* sp.) growing in the Kalumburu Mission's campground, Kimberley region, northern WA during our initial visit to the area 28 March to 4 April 1996. Adults were also encountered very commonly roosting in trees along the creeks crossing the Kalumburu Road up to 15 km south of the Kalumburu township, where the larval food plant *Celtis philippensis* Blanco, 1837 (Ulmaceae) grows.
Danaus genutia alexis (Waterhouse & Lyell, 1914)	Not previously recorded in February, March or November. A single male was collected by one of us (SSB) at East Point coastal reserve, Darwin, NT on 10 February 2007. In November 2009, all stages of the butterfly were observed, with adults commonly encountered flying in areas adjacent to the bulrushes growing around the verges of Lake Kununurra, WA.

Family / Species	Comments
	In early April 1995, all stages of the butterfly were observed and collected at Ivanhoe Crossing near Kununurra, the original location where the life history was discovered (Meyer 1995), indicating that adults would also be encountered in March at this locality.
LYCAENIDAE	
Nesolycaena caesia d'Apice & Miller, 1992	Not previously recorded in March or November. During our visit to the Kalumburu area from 28 March to 4 April 1996, adults were very commonly encountered flying on the sandstone outcrops adjacent to Ooraro Hill near the Kalumburu township (14°17'17.77"S, 126°40'3.42"E). Larvae were located on the larval food plant, later identified as *Boronia wilsonii* (F.Muell. ex Benth.) Duretto (Rutaceae) in 1996 and reared to adult. Adults were also observed and collected during a subsequent visit 24-27 March 2009 and again on 3 November 2009. All immature stages were located on the same food plant in November 2009 and reared to adult.
Jamides amarauge Druce, 1891	Not previously recorded in January, March or May. We observed and collected both sexes from Green Hill, Thursday Island, Qld on 25 March 2000; Murray Island, eastern Torres Strait, Qld from 27 March to 4 April 2000; and Dauan Island, northern Torres Strait, Qld from 26 April to 2 May 2002 and again during 7-14 January 2011.
Pithecops dionisius dionisius (Boisduval, 1832)	Not previously recorded in March. We collected seven males from three sites in the Iron Range area, Cape York Peninsula, Qld, with Dr C.G. Miller during our visit to the area 11-18 March 2011.

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The authors would like to thank Dr Grant Miller for his company during a number of the field trips during which the records were made, Frank Pierce for permission to include his photographic records of *Leptosia nina* from the Mitchell Plateau in this paper and the Department of Environment and Conservation, WA for granting Scientific Permits SF006809 and SF007098 under which the 2009 field trips to the Kimberley region were conducted. Specimens in Queensland were collected under endorsed permits provided by the Entomological Society of Queensland.

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A REVIEW OF THE *POLYRHACHIS CONTINUA* SPECIES-GROUP OF THE SUBGENUS *MYRMA* BILLBERG (HYMENOPTERA: FORMICIDAE: FORMICINAE) WITH KEYS AND DESCRIPTIONS OF NEW SPECIES

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Abstract

Sixteen species of the *Polyrhachis continua* species-group of the subgenus *Myrma* Billberg are presently recognised, including eight previously described: *Polyrhachis conops* Forel, *P. continua* Emery, *P. inusitata* Kohout, *P. procera* Emery, *P. sericeopubescens* Donishorpe, *P. simpla* Santschi, *P. spinifera* Stitz and *P. stitzi* Santschi; and eight species described as new: *P. gazelle* sp. n., *P. manusensis* sp. n., *P. neuguinensis* sp. n., *P. planoculata* sp. n, *P. pulleni* sp. n., *P. robusta* sp. n., *P. sinuata* sp. n. and *P. tapini* sp. n. *Polyrhachis stitzi* Santschi, originally described by Karavaiev as *P. conops bismarckensis*, is raised to specific status and redescribed. The former subspecies and junior primary homonym *P. conops cuspidata* Stitz is considered a synonym of *P. sericeopubescens* Donisthorpe. A key to the species of the group is provided and all species are illustrated.

Introduction

The *Polyrhachis continua* species-group is a relatively small group of closely similar species within the subgenus *Myrma* Billberg. Species of the group were traditionally placed in the *P. relucens*-group (Emery 1925, Kohout 1989, Dorow 1995), until the *continua*-group was introduced by Kohout (1998). However, it was not until a decade later that Kohout (2008) provided basic characters distinguishing its constituents from other species of the subgenus as follows: 'The *continua*-group is characterised by an evenly convex mesosomal outline and the presence of postocular and lateral ridges on the head.' Historically, the *continua*-group species represent relatively recent additions to the composition of this subgenus.

It was more than a hundred years after Fabricius (1782) described *Formica militaris*, which later became the type species of the subgenus *Myrma*, that the first *continua*-group species, *P. continua* from Ternate and *P. continua procera* from New Guinea, were described by Emery (1887, 1897). These were closely followed by *P. conops*, described by Forel (1901) from the Bismarck Archipelago and the only species of the group described by this prolific author. In 1911, Stitz described *P. conops cuspidata* and *P. conops spinifera* from New Guinea; however, the former became a junior primary homonym of *P. cuspidatus*, described in 1857 by Fr. Smith, while the latter was also described by Emery (1911), as the synonym *P. continua hirsutula*. The next two additions to the group, *P. conops simplex* from Aru Island and *P. conops bismarckensis* from New Britain, were described by Karavaiev (1927), but both these names were already in use elsewhere in the genus. Santschi (1928), who realised Karavaiev's oversight, promptly renamed them in the following year, as *P. conops simpla* and *P. conops stitzi* respectively.

In 1941, Donisthorpe described *P. sericeopubescens* from Japen Island and, almost fifty years later, Kohout (1989) described *P. inusitata*, the only Australian species of the group. The present paper describes eight new species in the *continua*-group, five from the New Guinean mainland (*P. neuguinensis*, *P. planoculata*, *P. pulleni*, *P. robusta* and *P. tapini*) and three from the Bismarck Archipelago (*P. gazelle*, *P. sinuata* and *P. manusensis*), bringing the number of its constituents to sixteen.

Generally, species of the *continua*-group are uncommonly encountered in the field and consequently they are relatively poorly represented in most of the collections examined. As *continua*-group species are lignicolous, selecting various tree cavities or bamboo internodes as their nesting sites, they are often overlooked, or missed by the more common mass-collecting methods such as insecticidal fogging or pitfall traps. Also, their colonies appear to be relatively small, mostly well under 50 individuals, which means that only a small number of workers will be foraging at any one time. This may explain why one of the described species is known only from the original series (*P. conops*) and three of the newly described species (*P. gazelle*, *P. planoculata* and *P. sinuata*) are each known only from a single specimen.

Methods

Photographs of specimens were taken with a digital camera attached to a stereomicroscope and processed using Auto-Montage (Syncroscopy, Division of Synoptics Ltd, USA) and Adobe Photoshop CS2 (Adobe Systems Inc., USA). Images of *P. continua* Emery, *P. gazelle* sp. n., *P. inusitata* Kohout, *P. manusensis* sp. n., *P. neuguinensis* sp. n., *P. planoculata* sp. n., *P. pulleni* sp. n., *P. robusta* sp. n., *P. sinuata* sp. n. and *P. tapini* sp. n. are of the holotypes, while those of *P. conops* Forel, *P. procera* Emery, *P. sericeopubescens* Donisthorpe, *P. simpla* Santschi and *P. spinifera* Stitz are of syntypes. Images of *P. stitzi* Santschi are of the voucher specimen selected from the additional series as discussed below under that species.

The use of the terms 'New Guinea', 'Bismarck Archipelago', 'New Britain' and 'New Ireland' alone indicate the biogeographic delimitation of these regions regardless of their current political boundaries. New Guinean localities at which ants were collected by the Bishop Museum's collectors were checked against that institution's locality list (BPBM 1966, unpublished). Their latitude and longitude co-ordinates and altitudes are only approximate.

Lists of synonymies presented here are not always comprehensive; for full synonymic citations see Dorow (1995), Bolton (1995) and Bolton *et al.* (2007). Publication dates and the spelling of species' and authors' names generally follow Bolton *et al.* (2007). The placement of *Myrma* Billberg, 1820 as a junior synonym of *Polyrhachis* Fr. Smith, 1857 follows a ruling of the ICZN (1999), which gave nomenclatural precedence to the latter genus.

Standard measurements (in mm) and indices follow those of Kohout (2008): TL = Total length (the necessarily composite measurement of the outstretched length of the entire ant measured in profile); HL = Head length (the maximum measurable length of the head in perfect full face view, measured from the anterior-most point of the clypeal border or teeth to the posterior-most point of the occipital margin); HW = Head width (width of the head in perfect full face view, measured immediately in front of the eyes); CI = Cephalic index (HW x 100/HL); SL = Scape length (length of the antennal scape, excluding the condyle); SI = Scape index (SL x 100/HW); PW = Pronotal width (width of the pronotal dorsum measured at the bases of the pronotal spines, or across the humeri in species without spines); MTL = Metathoracic tibial length (maximum measurable length of the tibia of the hind leg). All measurements were taken using a Zeiss (Oberkochen) SR stereomicroscope with an eyepiece graticule calibrated against a stage micrometer.

Abbreviations of common terms: c. = circa; Distr. = District; for. = forest; Mt = Mountain; Mts = Mountains; nr = near; Pen. = Peninsula; Pltn = Plantation; Prov. = Province; Ra. = Range; Riv. = river; rf. = rainforest; sclero. = open sclerophyll forest; Stn = Station; w = worker/s.

Abbreviations for institutions (with names of cooperating curators): ANIC – Australian National Insect Collection, Canberra, Australia (Dr S.O. Shattuck); BMNH – The Natural History Museum, London, UK (S. Ryder, Dale-Skey Papilloud); IZAS – Institute of Zoology, Ukrainian Academy of Sciences, Kiev, Ukraine (Dr A.G. Radchenko); MSNG – Civic Museum of Natural History 'Giacomo Doria', Genova, Italy (Dr R. Poggi); MCZC – Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA (Dr S.P. Cover); MHNG – Muséum d'Histoire Naturelle, Geneva, Switzerland (Dr B. Merz); MNHU – Museum für Naturkunde, Humboldt-Universität, Berlin, Germany (Dr F. Koch); NMNH – National Museum of Natural History, Smithsonian Institution, Washington DC, USA (Dr T.R. Schultz); QMBA – Queensland Museum, Brisbane, Australia (Dr C.J. Burwell).

Systematics

Genus *Polyrhachis* Fr. Smith, 1857

Polyrhachis Fr. Smith, 1857: 58. Type species: *Formica bihamata* Drury, 1773, by original designation.

Subgenus *Myrma* Billberg, 1820

Myrma Billberg, 1820: 104. Type species: *Formica militaris* Fabricius, 1782: 493; by subsequent designation of Wheeler, 1911: 859.

Myrma Billberg; Wheeler, 1911: 859 (as genus and senior synonym of *Polyrhachis* Fr. Smith, 1857).

Myrma Billberg; Wheeler, 1922: 993 (as subgenus of *Polyrhachis* Fr. Smith, 1857).

(For full reference citations with synonymy see Dorow *et al.* 1997).

Polyrhachis continua species-group

Characters of the P. continua *species-group*

Worker. Medium-sized to relatively large ants (HL > 2.30) with general characteristics of the genus and subgenus. Head with sides in front of eyes subparallel or weakly convex towards mandibular bases; sides in most species distinctly wider behind the eyes with postocular and lateral ridges extending on each side towards occipital corners. Eyes usually large, situated well back, giving face a characteristic elongated appearance; in some species eyes distinctly posteriorly protracted (*e.g. P. conops* Forel), or posteriorly truncate (*P. sinuata*); however, in one species (*P. planoculata*) eyes virtually flat, not reaching cephalic outline in full face view. Antennal scapes relatively long (SL >180). Mesosoma in profile with evenly convex outline, in most species without distinct border between propodeal dorsum and declivity. Sculpture of head and mesosoma ranging from rather finely and uniformly reticulate-punctate (as in *P. inusitata* Kohout and *P. tapini*), to distinctly longitudinally striate (as in *P. conops* and *P. manusensis*), with gaster finely shagreened. Appressed pubescence virtually lacking from most parts of body in all species, except for a very fine, diluted, reddish-brown patch on gastral dorsum. Dorsal surfaces of mesosoma and petiole almost completely hairless (as in *P. continua* Emery), or with rather short, erect hairs (as in *P. spinifera* Stitz or *P. manusensis*); head and apex of gaster in most species with several short or medium length, erect or posteriorly inclined, hairs. Colour of all species is virtually black throughout with somewhat semiopaque shine; appendages black or dark reddish brown.

Queen. Apart from distinctly larger size and usual sexual characters, including three ocelli and fully developed mesosoma with wings, very similar to worker.

Male. Males of only a few species are known and as such, their treatment has not been attempted here.

Within the group the species clearly polarise into two complexes, centring on *P. continua* and *P. conops*. The *continua*-complex includes species with the petiole distinctly higher than wide and armed with rather elongated dorsal spines and usually very short or rudimentary lateral teeth (Fig. 45). The *conops*-complex includes species characterised by a petiolar node that is only marginally higher than wide and armed with short dorsal spines that are barely longer than their basal width and well developed and acute lateral teeth (Fig. 2) (except in *P. gazelle* sp. n.). The complexes are also clearly divided geographically. The *continua*-complex is distributed throughout mainland New Guinea, extending westwards to Indonesia and southwards to Cape York Peninsula in Queensland, while distribution of species of the *conops*-complex appears to be limited to the islands of the Bismarck Archipelago.

Distribution and biology. The *continua*-group comprises mostly Melanesian elements with its known distribution extending from Sulawesi and the Moluccas (Ternate I.), across New Guinea to the Bismarck Archipelago, including New Britain, New Ireland and Manus Island, and south to Cape York Peninsula in Queensland. However, the group is predominantly New Guinean, where it is most diverse, both in the number of species and morphologically. Members of the *continua*-group are lignicolous, using various tree cavities, including rotten logs or hollow internodes of dry bamboo stems for their nesting sites. Only one species (*P. tapini*) was recorded nesting in soil in the ground (Taylor, specimen label data).

Key to workers of the *P. continua* species-group

1 Petiolar node with dorsal spines short, tooth-like, barely longer than their basal width (Fig. 2); lateral petiolar spines distinct, acute (except in *P. gazelle* sp. n.); eyes more-or-less protracted or truncate posteriorly (Bismarck Archipelago) (*conops*-complex) 2

- Node of petiole with dorsal spines elongated (Fig. 45); lateral petiolar spines very short or rudimentary; eyes more-or-less normal (New Guinea, Indonesia, Australia) (*continua*-complex) 6

2 Antennal scapes with numerous short hairs along leading edges 3

- Antennal scapes without hairs 5

3 Dorsum of mesosoma and basal gastral tergite without hairs; eyes distinctly protracted posteriorly (Figs 1, 4) (New Britain) .... *conops* Forel

- Dorsum of mesosoma and gaster with numerous erect hairs; eyes more-or-less normal or posteriorly truncate 4

4 Petiolar node, including spines, with numerous short, erect hairs around base and along lateral margins; dorsum of mesosoma distinctly longitudinally striate; eyes convex, more-or-less normal (Figs 8, 12) (Manus I.) ..... *manusensis* **sp. n.**

- Petiolar node without hairs; dorsum of mesosoma only finely longitudinally striate; eyes rather flat, posteriorly truncate (Figs 9, 14) (New Ireland) ..... *sinuata* **sp. n.**

5 Petiolar node relatively wide with lateral spines well developed; eyes distinctly protracted posteriorly (Figs 10, 15) (New Britain) .... *stitzi* Santschi

- Petiolar node relatively narrow with lateral spines reduced to blunt angles; eyes more-or-less normal, not protracted posteriorly (Fig. 3) (New Britain) ..... *gazelle* **sp. n.**

6 Eyes flat, in full face view not reaching lateral cephalic outline (Figs 26, 29) ..... *planoculata* **sp. n.**

- Eyes convex, in full face view clearly breaking lateral cephalic outline (*e.g.* Figs 17, 18, 19) 7

7 Antennal scapes without hairs or occasionally with only a few hairs present along leading edge 8

- Antennal scapes with numerous short to medium length hairs along leading edge and fewer hairs along inferior edge 10

8 Lateral margins of mesonotal dorsum converging posteriorly; pronotal spines relatively short, broadly based, only about 2x as long as basal width; lateral petiolar spines reduced to small acute teeth .... *continua* Emery

- Lateral margins of mesonotal dorsum converging anteriorly or subparallel; pronotal spines relatively long and slender, distinctly longer than 2x basal width; lateral petiolar spines blunt or obsolete 9

9 Dorsal petiolar spines relatively short, subparallel; lateral margins of pronotal and mesonotal dorsa virtually flat; dorsum of gaster with only a few rather short hairs ..... *procera* Emery

- Dorsal petiolar spines rather long, divergent; lateral margins of pronotal and mesonotal dorsa narrowly, but distinctly upturned; dorsum of gaster with numerous, medium length hairs ..... *tapini* **sp. n.**

10 Lateral petiolar spines obsolete; dorsum of mesosoma finely reticulate-punctate (Australia, Cape York Pen.) ..... *inusitata* Kohout

- Lateral petiolar spines produced into small, but distinct, acute teeth; dorsum of mesosoma more-or-less regularly, longitudinally striate (New Guinea) 11

11 Propodeal teeth upturned, acute (Figs 25, 34, 39); propodeum with more-or-less distinct, blunt, transverse carina partly dividing dorsum from declivity; petiolar node, including spines, with numerous short, erect hairs around base and along lateral margins 12

- Propodeal teeth virtually lacking (Figs 43, 48, 50); propodeal dorsum descending into declivity in medially uninterrupted line; petiolar node without hairs, except a fringe of very short hairs along base and subpetiolar process 14

12 Smaller (HL < 2.60), more slender species..... *neuguinensis* **sp. n.**

- Larger (HL > 2.90), broader species 13

13 Pronotal spines long and slender, almost 3x as long as basal width; clypeus in profile only weakly sinuate; antennal scapes generally longer (SI 185-199) ..... *robusta* **sp. n.**

- Pronotal spines shorter, broadly based, only about 2x as long as basal width; clypeus in profile distinctly sinuate; antennal scapes generally shorter (SI 179-188) ..... *pulleni* **sp. n.**

14 Lateral margins of mesonotal dorsum distinctly converging posteriorly; pronotal dorsum with lateral margins flat ..... *simpla* Santschi

- Lateral margins of mesonotal dorsum subparallel; pronotal dorsum with lateral margins upturned 15

15 Larger species (HL > 2.80); pronotal dorsum markedly wide, about 1.5x wider than long; pronotal spines with broad, more-or-less dorsally flattened bases ..... *spinifera* Stitz

- Smaller species (HL < 2.70); pronotal dorsum narrower, only about 1.13x wider than long; pronotal spines slender with dorso-medially flattened bases ..... *sericeopubescens* Donisthorpe

Polyrhachis conops-complex

Polyrhachis conops Forel, 1901

(Figs 1-2, 4-5)

Polyrhachis conops Forel, 1901: 28. Syntype workers, queens, males. Type locality: BISMARCK ARCHIPELAGO [NEW BRITAIN], Herbertshöhe (F. Dahl), MNHU, MHNG (examined).

Dimensions of syntypes (queens cited last): TL c. 9.93-11.18, 11.94-12.65; HL 2.43-2.67, 2.72-2.82; HW 1.89-2.09, 2.17-2.22; CI 77-79, 79-80; SL 3.17-3.43, 3.48-3.53; SI 162-168, 159-160; PW 1.71-1.86, 2.52-2.57; MTL 3.33-3.58, 3.63-3.68 (5+2 measured).

Remarks. The syntypes of *P. conops* are the only specimens known of this species. It stands between *P. continua* Emery and *P. manusensis* sp. n., featuring the slender and elegant stature of the former and the petiolar armament of the latter. Several specimens of the type series show a mild tendency of the eyes changing their shape from posteriorly protracted to almost normal. The eyes are usually distinctly protracted posteriorly (Figs 1, 4); however, in several specimens examined this character appears to be less prominent, with the eyes almost normal. This character is not uncommon in the subgenus *Myrma*, with several taxa described solely on the presence or lack of the posteriorly protracted eyes, such as in *P. nigropilosa conophthalma* Emery, 1900, or *P. striatorugosa exophthalma* Forel, 1913.

Polyrhachis gazelle sp. n.

(Figs 3, 6-7)

Type. Holotype worker: PAPUA NEW GUINEA, New Britain Prov., Gazelle Pen., Mt Sinewit, 04°38'S, 151°58'E, c. 900 m, 5-9.xi.1962, J. Sedláček (QMT 174960), in QMBA.

Description. Worker. Dimensions: TL c. 11.34; HL 2.72; HW 2.02; CI 74; SL 3.88; SI 192; PW 1.71; MTL 4.03.

Anterior clypeal margin arcuate; clypeus with poorly indicated, blunt, median carina; clypeus weakly sinuate in profile, posteriorly rounding into shallow basal margin. Frontal triangle distinctly impressed. Frontal carinae sinuate, closely approximate anteriorly with acute, almost vertically raised margins; central area relatively narrow

with rather flat frontal furrow. Sides of head in front of eyes diverging anteriorly in weakly convex line before rounding into mandibular bases; behind eyes, sides forming a blunt carina extending towards rather prominent occipital corners. Eyes convex, in full face view exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum with long, slender, acute spines that are directed anterolaterally and curve slightly downwards, following lateral outline of mesosomal dorsum; lateral edges of spines acute and continuous with parallel margins of pronotum. Promesonotal suture distinctly impressed laterally; mesonotal dorsum transverse with weakly raised anterior corners; lateral margins shallowly emarginate at midlength before converging into medially flat metanotal groove. Propodeal dorsum with lateral margins subparallel, terminating posteriorly in rather indistinct, minute teeth; dorsum descending into declivity in medially uninterrupted line. Petiole scale-like, only marginally higher than wide, with anterior and posterior faces converging dorsally in virtually straight line; dorsal margin armed with two wide-based and tooth-like, acute spines, with inner margins continuous medially, forming 'U'-shaped dorsum of segment; lateral margin of petiole below base of each spine with angular prominence. Anterior face of first gastral segment flat with anterodorsal margin widely rounding onto dorsum of gaster.

Mandibles distinctly longitudinally striate with piliferous pits. Clypeus reticulate-punctate; sides of head obliquely, vertex mostly longitudinally, striate. Sculpturation on pronotal dorsum finely reticulate-punctate anteriorly, with reticulae more longitudinally organised towards promesonotal suture. Mesonotal and propodeal dorsa more distinctly longitudinally striate; sides of mesosoma and propodeal declivity reticulate-punctate. Petiole and gaster shagreened.

Mandibles along outer margins and masticatory borders with numerous semierect, golden hairs. Anterior clypeal margin with a few longer setae medially and several shorter setae fringing margin laterally. Several pairs of medium length, golden hairs on clypeus, along frontal carinae and single pair of longer, anteriorly inclined hairs on vertex; no hairs lining lateral cephalic outline in full face view. Antennal scapes, mesosoma, petiole, legs and gaster without hairs, except a few hairs on gastral venter and apex. Whitish, closely appressed pubescence rather scarcely distributed on most dorsal surfaces, more abundant with distinctly reddish tint on gastral dorsum.

Colour. Black; narrow band behind mandibular masticatory border, apical funicular segments, legs, including mid and hind coxae, and gaster medium reddish brown.

Sexuals and immature stages unknown.

Etymology. Named after the type locality, Gazelle Peninsula on New Britain, Bismarck Archipelago.

Remarks. The holotype is the only specimen known of this species. It was collected at Mt Sinewit by the late Josef Sedláček, a former field worker and a long-time associate of the Bernice P. Bishop Museum, Honolulu, Hawai'i. With rudimentary lateral petiolar teeth and more-or-less normally shaped eyes, *P. gazelle* appears to represent an intermediate form between the *P. conops* and *P. continua* complexes.

Figs 1-7. *Polyrhachis* spp. (1-2, 4-5) *P. conops* Emery (syntype): (1) head in full face view; (2) petiole in frontal view; (4) dorsal view; (5) lateral view. (3, 6-7) *P. gazelle* sp. n. (holotype): (3) head in full face view; (6) dorsal view; (7) lateral view. Not to scale.

***Polyrhachis manusensis* sp. n.**

(Figs 8, 11-12)

Types. Holotype worker: PAPUA NEW GUINEA, Manus Island Prov., c. 8-10 km WSW of Lorengau, 02°04'S, 147°12'E, 150-200 m, 27-28.vii.1984, rf., ex nest in tree trunk crevice, R.J. Kohout acc. 84.135 (worker). *Paratypes*: data as for holotype (56 workers). Holotype and 4 paratypes in ANIC; most paratypes in QMBA; 2 paratypes each in AMNH, BMNH, CASC, MCZC, MHNG, MNHU and NMNH.

Additional material examined. PAPUA NEW GUINEA: Manus Island Prov., (same data as for holotype, only RJK acc. 84.138) (w); ditto, ex nest in dry bamboo internode (RJK acc. 84.144) (w).

Description. Worker. Dimensions (holotype cited first): TL c. 10.84, 9.68-11.34; HL 2.64, 2.34-2.68; HW 2.00, 1.78-2.06; CI 76, 74-78; SL 3.48, 3.22-3.53; SI 174, 169-181; PW 2.15, 1.87-2.18; MTL 3.58, 3.22-3.73 (14 measured).

Anterior clypeal margin arcuate, medially obtusely truncate. Clypeus with poorly defined, blunt median carina; clypeus virtually straight in profile with rather flat basal margin. Frontal triangle distinct. Frontal carinae sinuate with moderately raised margins; central area with poorly defined frontal furrow. Sides of head in front of eyes weakly concave towards mandibular bases; behind eyes, sides produced into blunt carina extending towards rather prominent occipital corners. Eyes mildly protracted posteriorly; in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum distinctly wider than long with relatively short, broad-based, acute spines directed anterolaterally and curved slightly downwards; lateral edges of spines acute and continuous with weakly upturned pronotal margins. Promesonotal suture distinctly impressed; mesonotal dorsum strongly transverse, with moderately raised lateral margins; metanotal groove deeply impressed laterally, rather flat and posteriorly bowed medially. Propodeal dorsum with lateral margins strongly raised anteriorly, virtually flat posteriorly, terminating in blunt propodeal teeth, lateral borders of teeth continuous posteriorly and somewhat curved inwards into declivity. Petiole scale-like, dorsal margin armed with two, broad-based, acute spines with inner margins forming 'U'-shaped dorsum of segment; lateral margin of petiole below base of each spine with distinct, acute tooth. Anterior face of first gastral segment flat with anterodorsal margin widely rounding onto dorsum of gaster.

Mandibles distinctly, longitudinally striate with numerous piliferous pits towards masticatory borders. Clypeus reticulate-punctate with rest of head and mesosoma, including sides, distinctly, mostly longitudinally striate; propodeal declivity and petiole, including spines, finely reticulate-punctate. Gaster finely reticulate-punctate with sculpture on dorsum somewhat longitudinally striate.

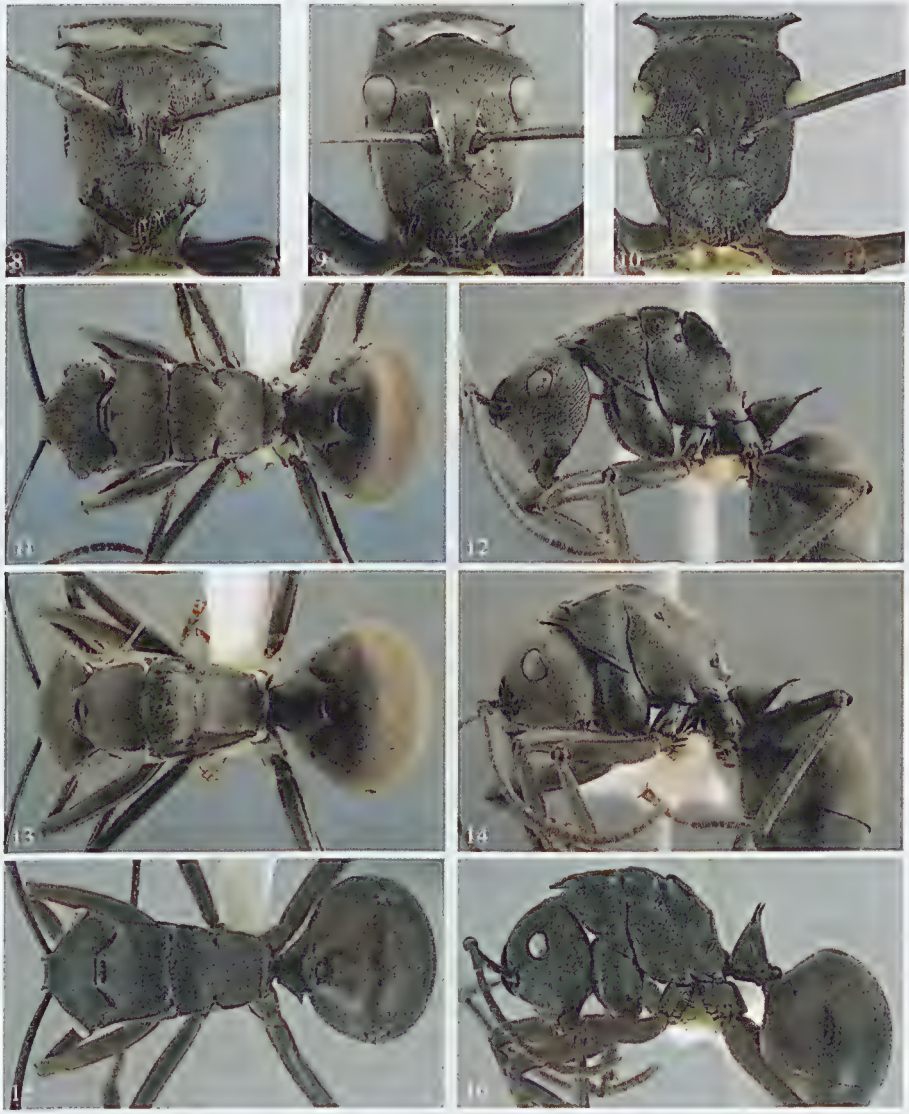
Mandibular masticatory borders and outer margins with numerous, semierect, golden hairs. Anterior clypeal margin medially with several long, anteriorly directed, golden setae with distinct reddish tint and fringe of shorter setae laterally. Numerous short to medium length, erect to semierect hairs on clypeus, along frontal carinae and vertex, many hairs fringing lateral cephalic outline in full face view. Antennal scapes with several semierect, short to medium length hairs along leading edge and a few hairs along inferior edge towards apices. Mesosoma, except declivity, and legs, except dorsal surfaces of femora, with numerous short to medium length, erect hairs; petiole with numerous shorter hairs along lateral margins near base and a few occasional hairs on dorsal spines. Gaster with numerous medium length, posteriorly inclined hairs, increasing in length towards gastral apex. Closely appressed, silvery white or greyish pubescence variously distributed over most body surfaces, somewhat shorter with distinctly reddish tint on gastral dorsum.

Colour. Black; mandibular teeth and apical funicular segments reddish brown. Legs dark to very dark reddish brown; tarsi mostly black. Gaster black, apex and venter dark reddish brown.

Sexuals and immature stages unknown.

Etymology. Named after Manus Island in the Bismarck Archipelago.

Remarks. *Polyrhachis manusensis* is characterised by its distinctly striate head and rather broad, longitudinally striate dorsum of mesosoma, which has short, broadly based pronotal spines. It is evidently endemic to Manus Island.



Figs 8-16. *Polyrhachis* spp. (8, 11-12) *P. manusensis* sp. n. (holotype): (8) head in full face view; (11) dorsal view; (12) lateral view. (9, 13-14) *P. sinuata* sp. n. (holotype): (9) head in full face view; (13) dorsal view; (14) lateral view. (10, 15-16) *P. stitzi* (voucher specimen): (10) head in full face view; (15) dorsal view; (16) lateral view. Not to scale.

Polyrhachis sinuata sp. n.

(Figs 9, 13-14)

Type. Holotype worker: PAPUA NEW GUINEA, New Ireland Prov., Lelet Plateau, c. 03°20'S, 151°51'E, c. 950 m, 19-21.vii.1984, R.J. Kohout acc. 84.92 (worker), in ANIC.

Description. Worker. Dimensions: TL c. 10.84; HL 2.65; HW 2.09; CI 79; SL 3.63; SI 174; PW 1.53; MTL 3.73.

Anterior clypeal margin arcuate. Clypeus without distinct median carina; virtually straight in profile with shallow basal margin. Frontal triangle distinct. Frontal carinae sinuate with only moderately raised margins anteriorly, flat posteriorly; central area flat with indistinct frontal furrow. Sides of head in front of eyes straight towards mandibular bases; behind eyes sides produced into blunt carina extending towards occipital corners. Eyes rather flat, notably when viewed from above, with posterior blinkers, in full face view eyes marginally exceeding lateral cephalic outline. Ocelli lacking; position of median ocellus indicated by distinct pit in cephalic sculpturation. Pronotum armed with very short, slender, anterolaterally and dorsally directed spines with lateral edges continuous with pronotal margins in convex line towards promesonotal suture. Dorsum of mesosoma convex, only marginally wider than long; lateral margins only narrowly and weakly raised anteriorly, converging posteriorly into distinct metanotal groove. Propodeal dorsum in profile forming single convex line with declivity; lateral margins only weakly converging posteriorly in dorsal view, terminating in weakly raised, blunt tuberculae. Petiole, including spines, as wide as high; dorsal spines relatively short and slender; lateral teeth short. Anterior face of first gastral segment flat, marginally higher than full height of petiole.

Mandibles distinctly, longitudinally striate with numerous piliferous pits towards masticatory borders. Clypeus reticulate-punctate with rest of head and sides mostly longitudinally striate. Dorsum of mesosoma finely, more-or-less regularly, longitudinally striate; sides of mesosoma reticulate-punctate with sculpture organised into somewhat irregular striations. Petiole very finely reticulate-punctate. Gaster reticulate-punctate with sculpture on dorsum somewhat longitudinally striate.

Colour. Black; mandibular teeth dark reddish brown, narrow reddish band along masticatory border. Apical funicular segments and legs very dark reddish brown; tarsi mostly black. Gaster black, apex and venter dark reddish brown.

Sexuals and immature stages unknown.

Etymology. Named for the somewhat sinuate outline of the mesosoma in dorsal view.

Remarks. Polyrhachis sinuata is a very distinct species featuring very short and slender pronotal spines and a finely, somewhat longitudinally, reticulate-striate mesosomal dorsum. Also, the shape of the eyes differs from other species of the *continua*-group in being flat with posterior blinkers, quite similar to those in species of subgenus *Hemioptica* Roger (see Dorow and Kohout 1995) or *P. aculeata*-group species of the subgenus *Myrma*

(manuscript in preparation). The unique holotype was collected foraging on low vegetation in open woodland along a walking track and, in spite of a subsequent search, no other specimens were found. *Polyrhachis sinuata* appears to be a rare species endemic to higher elevations along the summit of Lelet Plateau on New Ireland.

Polyrhachis stitzi Santschi, 1928

(Figs 10, 15-16)

Polyrhachis (Myrma) conops var. *bismarckensis* Karavaiev, 1927: 46. Holotype worker. Type locality: BISMARCK ARCHIPELAGO, ?MNHU, ?IZAS (location of type unknown). Junior primary homonym of *P. mucronata bismarckensis* Forel, 1901: 33).

Polyrhachis (Myrma) conops var. *stitzi* Santschi, 1928: 139. Replacement name.

Polyrhachis (Myrma) conops var. *stitzi* Santschi; Kohout, 1998: 519. Junior synonym of *P. conops* Forel, 1901. Spurious synonymy.

The holotype of *P. conops stitzi* cannot be found in the Karavaiev collection (IZAS) or in the Stitz collection (MNHU) and appears to have been lost. However, during one of my visits to the Zoological Museum of Humboldt University in Berlin, that houses the bulk of the Stitz collection, I located a small bottle containing five unidentified *Polyrhachis* specimens labelled 'Ralum Dahl'. The series included 2 workers and 3 alate queens, all callows in various stages of pigmentation, with both workers and two queens in a sound condition for dry mounting. Their subsequent comparison with *P. conops* types, together with Karavaiev's brief description, supports my opinion that these specimens actually represent *P. conops stitzi*. Considering that the holotype was also a callow specimen ('The segments of the gaster, from third on, dark yellowish-brown'), it seems reasonable to conclude that these specimens are part of the original series from which Stitz sent a single worker specimen to Karavaiev (1927: 46), who diagnosed is as follows:

> '*Polyrhachis* (*Myrma*) *conops* For. var. *bismarckensis* nova. (worker character). Clypeus ganz wie bei subsp. simplex, ohne Ausschnitt beiderseits des geradlinig abgestutzten Vorterrandes. Augen eiförmig, vorn breiter, konvex, schief gestellt, das spitzere Hinterende etwas sackförmig nach hinten hervorragend. Petiolusschuppe wie beim Arttypus. Gastersegmente, vom dritten an, dunkel ockerfarben. Bismarckarchipel, ein (worker character), von H. Stitz. Berliner Zool. Museum, erhalten.'

Redescription. Worker. Dimensions: TL c. 9.63-10.63; HL 2.62-2.74; HW 2.03-2.15; CI 77-78; SL 3.43-3.53; SI 164-169; PW 1.91-2.02; MTL 3.58-3.78 (2 measured).

Anterior clypeal margin arcuate, narrowly medially truncate. Clypeus with blunt, rather indistinct median carina, virtually straight in profile with shallow depression anteriorly and weakly impressed basal margin. Frontal triangle distinct. Frontal carinae sinuate with margins only moderately raised; central area flat with poorly indicated frontal furrow. Sides of head in front of eyes straight, weakly converging

towards mandibular bases; behind eyes sides produced into blunt carina extending towards rather prominent occipital corners. Eyes convex, distinctly protracted posteriorly; in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum wider than long with relatively short, broad-based, acute spines that are anterolaterally directed, somewhat dorsomedially flattened and curve slightly downwards; lateral edges of spines acute and continuous with weakly upturned margins of pronotum. Promesonotal suture distinctly impressed laterally, rather flat medially; mesonotal dorsum transverse with only weakly raised lateral margins, converging into medially flat, metanotal groove. Propodeal dorsum with lateral margins raised anteriorly, virtually flat posteriorly and terminating in distinct, minute teeth with inner borders continuous medially for short distance and terminating in blunt, rather indistinct, transverse carina that somewhat divides dorsum from declivity. Petiole scale-like, dorsal margin armed with two broad-based, tooth-like spines with inner margins forming widely open, 'U'-shaped dorsum of segment with indication of rudimentary intercalary tooth; lateral margin of petiole below base of each spine with distinct, acute tooth. Anterior face of first gastral segment flat, with anterodorsal margin rather narrowly rounding onto dorsum.

Mandibles distinctly, longitudinally striate. Clypeus reticulate-punctate with rest of head and mesosoma, including sides, distinctly, rather regularly, longitudinally striate; propodeal declivity and petiole, including spines, finely reticulate-punctate. Gaster shagreened.

Mandibular masticatory borders and outer margins with numerous semierect, golden hairs. Anterior clypeal margin medially with several medium length, anteriorly directed, golden setae and fringe of shorter setae laterally. Numerous short to medium length, erect to semierect hairs on clypeus, along frontal carinae and sides of head; number of hairs decreasing posteriorly with only a few shorter hairs on vertex. Antennal scapes, mesosoma, petiole and legs without hairs. Gaster with only a few, rather short, posteriorly inclined hairs, scattered towards apex and venter. Closely appressed, very short, white or greyish pubescence variously distributed over most body surfaces, including dorsum of gaster.

Colour. Black; mandibular masticatory borders lined reddish brown; antennae with funicular segments progressively lighter, yellowish brown towards apices. Legs, including mid and hind coxae, medium reddish brown; front coxae and tarsi shade darker. Gaster reddish brown.

Queen (not previously described). Dimensions: TL c. 11.54-11.89; HL 2.62-2.71; HW 1.95-2.09; CI 74-77; SL 3.33-3.38; SI 162-171; PW 2.37-2.40; MTL 3.48-3.53 (2 measured).

Queen larger than worker with usual characters identifying full sexuality, including three ocelli, complete thoracic structure and wings. Pronotal spines distinctly shorter, broad-based. Mesoscutum only marginally wider than long; lateral margins strongly converging anteriorly into narrowly rounded anterior margin; median line distinct; parapsides virtually flat; mesoscutum in profile with relatively low, widely rounded anterior face and only slightly convex dorsum. Mesoscutellum only weakly convex, not distinctly elevated above dorsal plane of mesosoma. Propodeum convex in outline with lateral margins terminating in medially directed, short ridges and blunt border

dividing propodeal dorsum from declivity. Petiole with dorsal spines distinctly shorter and wider at bases; dorsum with distinct intercalary tooth. Dorsum of mesoscutum with several short, erect hairs and a few marginally longer hairs on dorsum of mesoscutellum. Sculpturation, pubescence and colour very similar to worker.

Male and immature stages unknown.

Remarks. Polyrhachis stitzi stands relatively close to *P. conops* and I previously considered them conspecific (Kohout 1998: 519). However, after subsequent examination and direct comparison, I now believe they represent separate biological species. *Polyrhachis conops* is distinctly more slender with the leading edge of the antennae featuring numerous short hairs that are completely lacking in *P. stitzi*.

Polyrhachis continua-complex

***Polyrhachis continua* Emery, 1887**

(Figs 17, 20-21)

Polyrhachis continua Emery, 1887: 235, pl. 4, fig. 21. Holotype worker. Type locality: INDONESIA, Ternate I., Aqui Conora (O. Beccari), MSNG (examined).

Polyrhachis continua var. *revocata* Viehmeyer, 1913: 151. Syntype workers. Type locality: INDONESIA, SULAWESI (in copal), MNHU (examined). Synonymy by Kohout, 1998: 519.

Additional material examined. NEW GUINEA SE: Paumomu Riv. (= Angabanga Riv.), ix-xii.1892 (L. Loria) (w) [specimens in the Emery collection (MSNG) erroneously labelled as syntypes]. NEW GUINEA: Bulolo, 2300', 12.xii.1967, rf. (B.B. Lowery) (w). PAPUA: N. Distr., Managalese area, viii.1965 (R. Pullen) (w); Middle Moorhead Riv., c. 08°50'S, 141°30'E, viii.1965, dry sclero. (R. Pullen) (w). PAPUA NEW GUINEA: Northern Prov., Owen Stanley Ra., nr Mamba Pltn, c. 7 km WNW of Kokoda, 08°51'S, 147°41'E, 500 m, 31.viii-1.ix.1984 (RJK acc. 84.403) (w, ♀).

Worker. Dimensions (holotype cited first): TL c. 10.18, 9.42-10.68; HL 2.50, 2.31-2.59; HW 1.81, 1.65-1.87; CI 72, 70-74; SL 3.48, 3.12-3.48; SI 192, 181-192; PW 1.53, 1.53-1.87; MTL 3.68, 3.22-3.68 (1+10 measured).

Queen (not previously described). Dimensions: TL c. 11.04-11.29; HL 2.62-2.68; HW 2.09-2.12; CI 79-80; SL 3.38-3.43; SI 162; PW 2.37-2.40; MTL 3.33-3.48 (2 measured).

Queen larger than worker with usual characters identifying full sexuality, including three ocelli, complete thoracic structure and wings. Pronotal spines distinctly shorter, only about 2x as long as basal width. Mesoscutum wider than long; lateral margins converging anteriorly into narrowly rounded anterior margin; median line distinct; parapsides virtually flat anteriorly, weakly raised posteriorly; mesoscutum in profile with relatively low anterior face rounding onto weakly convex dorsum. Mesoscutellum only weakly convex, not elevated above dorsal plane of mesosoma. Propodeum with lateral margins terminating in medially directed, short ridges; propodeal dorsum descending into steeply descending declivity in medially uninterrupted line. Petiole with dorsal spines distinctly shorter, inner margins forming

'U'-shaped dorsum of segment. Sculpturation, pilosity, pubescence and colour scheme very similar to worker.

Male and immature stages unknown.

Remarks. Direct comparison of the *continua* holotype and *continua revocata* syntype has shown they are very similar. The clypeus is almost straight with only a shallow depression at the anterior margin, which is distinctly medially truncate. The frontal carinae are markedly closely approximate, leaving the central area rather narrow, only scarcely widening posteriorly towards the vertex. However, in *P. continua*, the somewhat flattened pronotal spines are shorter, less divergent and minutely emarginated at their bases, while in *P. continua revocata* the dorsolateral borders of the spines merge with the pronotal margins in an uninterrupted line. The petiolar spines of *P. continua revocata* are also slightly longer than in *P. continua*. The head and mesosoma in *P. continua* is very finely, more or less regularly, striate-punctate, while the sculpturation in *P. continua revocata* is somewhat more distinct and more regular. However, when the types of both are compared with additional material from New Guinea, it becomes apparent that the characters separating these forms fall well within the limits of variability of a single species.

Polyrhachis inusitata Kohout, 1989

(Figs 18, 22-23)

Polyrhachis inusitata Kohout, 1989: 513. Holotype and paratype worker. Type locality: AUSTRALIA, QUEENSLAND, Cape York Pen., West Claudie R., Iron Range area, 12°44'S, 143°14'E, 3-10.xii.1985 (G.B. Monteith & D. Cook) QMBA, ANIC.

Polyrhachis inusitata Kohout, 1998: 520. Junior synonym of *P. sericeopubescens* Donisthorpe, 1941: 61. Erroneous synonymy.

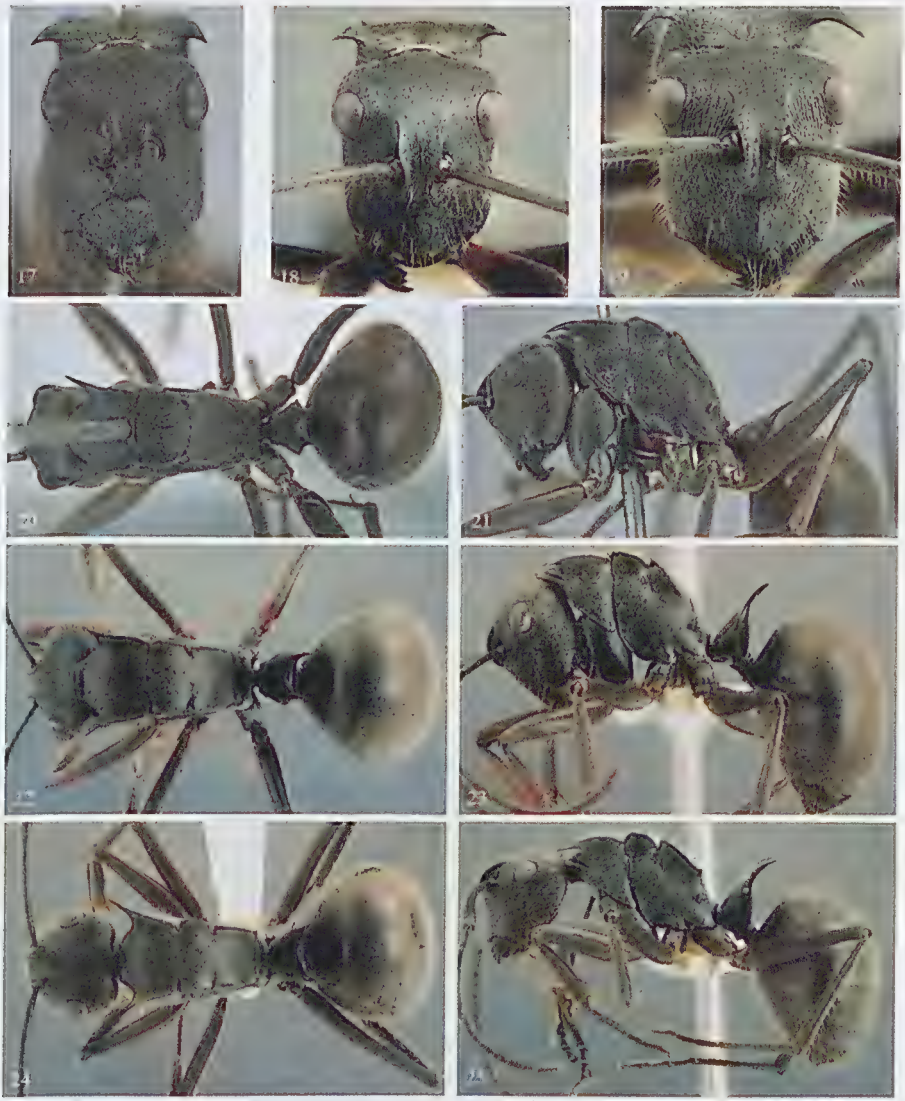
Polyrhachis inusitata Kohout; Kohout, 2012: 39. Status reversal.

Additional material examined. QUEENSLAND: McIlwraith Ra., Leo Creek Road, c. 13°44'S, 143°19'E, 10-20.vii.1976 (P. Filewood) (paratype worker); Cape York Pen., 6 km ENE of Mt Tozer, 12°44'S, 143°16'E, 30.vi.1986 (T. Weir & A. Calder) (w); McIlwraith Ra., 11 km WbyN of Bald Hill, 13°44'S, 143°20'E, 26.vi-13.vii.1989, 500 m (I.D. Naumann) (w).

Worker. Dimensions (holotype cited first): TL c. 10.53, 9.38-10.53; HL 2.56, 2.31-2.56; HW 1.87, 1.72-1.87; CI 73, 74; SL 3.53, 3.30-3.53; SI 189, 192-199; PW 1.61, 1.36-1.61; MTL 3.56, 3.38-3.58 (1+3 measured).

Sexuals and immature stages unknown.

Remarks. Polyrhachis inusitata closely resembles *P. sericeopubescens* Donisthorpe and *P. continua* Emery and previously was erroneously synonymised with the former (Kohout 1998). However, *P. inusiata* differs from *P. sericeopubescens* in several characters, including smaller size, irregularly reticulate-rugose sides of the mesosoma, distinctly shorter and



Figs 17-25. *Polyrhachis* spp. (17, 20-21) *P. continua* Emery (holotype): (17) head in full face view; (20) dorsal view; (21) lateral view. (18, 22-23) *P. inusitata* Kohout (holotype): (18) head in full face view; (22) dorsal view; (23) lateral view. (19, 24-25) *P. neuguinensis* sp. n. (holotype): (19) head in full face view; (24) dorsal view; (25) lateral view. Not to scale.

more abundant gastral pilosity and lateral petiolar teeth reduced to more or less distinct denticles or virtually obsolete. In contrast, the available syntype of *P. sericeopubescens* is larger (HL 2.62 in *sericeopubescens* versus 2.31-2.56 in *inusitata*), the lateral branches of mesosoma are distinctly longitudinally striate, the gastral pilosity is longer and more sparse and the lateral petiolar teeth are distinctly produced.

Polyrhachis inusitata differs from *P. continua* by its distinctly slender body, reticulate-rugose sculpturation and the abundant short hairs distributed over most of the body. In contrast, in *P. continua* the body is wider and relatively robust, the sculpturation on the head and mesosoma is more-or-less regularly longitudinally striate and the hairs are distinctly longer and much diluted.

***Polyrhachis neuguinensis* sp. n.**

(Figs 19, 24-25)

Types. Holotype worker: PAPUA NEW GUINEA, West Sepik Prov., Pes Mission, c. 12 km WSW of Aitape, 03°11'S, 142°15'E, c. 50 m, 3.viii.1984, swampy lowland rf., ex nest in tree trunk crevice, R.J. Kohout acc. 84.201 (worker). *Paratypes*: data as for holotype (10 workers, alate queen). Holotype, paratype worker and queen in ANIC; 5 paratype workers in QMBA; 2 paratype workers each in BMNH and MCZC.

Additional material examined. PAPUA NEW GUINEA, West Sepik Prov., Pes Mission, c. 12 km WSW of Aitape, 03°11'S, 142°15'E, c. 50 m, 3.viii.1984, swampy lowland rf., strays on low vegetation (RJK accs 84.160) (w).

Description. Worker. Dimensions (holotype cited first): TL c. 10.43, 9.37-10.43; HL 2.56, 2.34-2.56; HW 2.00, 1,78-2.00; CI 78, 76-80; SL 3.33, 3.02-3.33; SI 166, 162-172; PW 1.68, 1.50-1.68; MTL 3.53, 3.22-3.53 (11 measured).

Anterior clypeal margin arcuate, medially obtusely truncate and shallowly emarginate. Clypeus with posteriorly raised median carina; clypeus in profile straight with shallow depression behind anterior margin, posteriorly rounding into shallow basal margin. Frontal triangle distinctly impressed. Frontal carinae with highly raised, laminate margins; central area narrow with indistinct frontal furrow. Sides of head in front of eyes virtually straight, weakly converging anteriorly; behind eyes sides produced into blunt carina extending towards rather prominent occipital corners. Eyes convex, moderately posteriorly protracted, in full face view exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum with long, slender, acute spines directed anterolaterally and curved slightly downwards, lateral edges of spines acute and continuous with weakly upturned pronotal margins. Promesonotal suture distinctly impressed laterally; mesonotal dorsum transverse with strongly raised, laminate, lateral margins converging into medially flat, posteriorly bowed, metanotal groove. Propodeal dorsum with lateral margins strongly raised anteriorly, virtually flat posteriorly and terminating in distinct, acute teeth with inner borders continuous medially for short distance and terminating in blunt, transverse carina that somewhat divides propodeal dorsum from declivity. Petiole scale-like, with dorsal margin armed with two slender, posteriorly curved, acute spines with inner margins forming 'U'-shaped petiolar dorsum; lateral margins of petiole below base of each spine with

short, distinct, acute tooth. Anterior face of first gastral segment flat, anterodorsal margin widely rounding onto dorsum.

Mandibles distinctly, longitudinally striate. Clypeus reticulate-punctate; rest of head and mesosoma, including sides, distinctly, mostly longitudinally striate; propodeal declivity and petiole, including spines, finely reticulate. Gaster finely shagreened.

Mandibular masticatory borders and outer margins with numerous, semierect, golden hairs. Anterior clypeal margin with several long, anteriorly directed setae medially and fringe of shorter setae laterally. Numerous short to medium length, erect to semierect hairs on clypeus, along frontal carinae and vertex, many hairs fringing lateral cephalic outline in full face view. Antennal scapes with numerous, semierect, short to medium length hairs along leading edge and several hairs along inferior edge. Mesosoma, except declivity, and legs, except dorsal surfaces of femora, with numerous short to medium length, erect hairs; petiole with numerous shorter hairs along lateral margins, including inner margins of spines. Gaster with numerous medium length, posteriorly inclined hairs, distinctly increasing in length towards gastral apex and over venter. Closely appressed, silvery white or greyish pubescence variously distributed over most body surfaces, somewhat shorter with distinctly reddish tint on gastral dorsum.

Colour. Black; mandibular masticatory borders lined reddish brown; antennae with funicular segments progressively lighter, yellowish brown, towards apices. Legs, including mid and hind coxae, medium reddish brown; front coxae and tarsi a shade darker. Gaster reddish brown.

Queen. Dimensions: TL c. 11.69; HL 2.62; HW 2.09; CI 80; SL 3.28; SI 157; PW 2.34; MTL 3.53 (1 measured).

Queen larger than worker with usual characters identifying full sexuality, including three ocelli, complete thoracic structure and wings. Pronotal spines distinctly shorter, broad-based. Mesoscutum only marginally wider than long; lateral margins strongly converging anteriorly into narrowly rounded anterior margin; median line distinct; parapsides virtually flat; mesoscutum in profile with relatively low, widely rounded anterior face and only slightly convex dorsum. Mesoscutellum only weakly convex, not distinctly elevated above dorsal plane of mesosoma. Propodeum convex in outline with lateral margins terminating in medially directed, short ridges; propodeal dorsum descending into weakly concave declivity in medially uninterrupted line. Petiole with dorsal spines distinctly shorter and dorsum between with minute intercalary denticle. Sculpturation, pilosity, pubescence and colour scheme very similar to worker.

Male and immature stages unknown.

Etymology. Named after the island of New Guinea.

Remarks. *Polyrhachis neuguinensis* is an easily recognised species featuring a rather slender mesosomal dorsum with distinctly upturned lateral margins and relatively long pronotal spines. It also features acute, distinctly upturned, propodeal teeth and a transverse carina that completely divides the propodeal dorsum from the declivity. The type series specimens were collected from a nest in a tree crevice in swampy lowland rainforest.

***Polyrhachis planoculata* sp. n.**

(Figs 26, 29-30)

Type. Holotype worker: PAPUA NEW GUINEA, Northern Prov., Maru Riv. (= ? Maiiu Riv.), 32 km S of Wanigela, for. clearing, vii.1972, R.J. Pullen (w), in ANIC.

Description. Worker. Dimensions: TL c. 11.14; HL 2.81; HW 2.09; CI 74; SL 3.78; SI 181; PW 1.81; MTL 3.93 (1 measured).

Anterior clypeal margin arcuate, medially obtusely truncate. Clypeus with blunt, poorly indicated median carina; clypeus virtually straight in profile, posteriorly rounding into well impressed basal margin. Frontal triangle distinct. Frontal carinae with highly raised, laminate margins; central area narrow with rather short, but distinct, frontal furrow. Sides of head in front of eyes virtually straight, weakly converging anteriorly; behind eyes, sides produced into blunt carina extending towards occipital corners. Eyes rather flat, notably when viewed from behind, in full face view not reaching lateral cephalic outline. Ocelli lacking. Pronotal dorsum armed with only moderately long, anterolaterally directed, acute spines; lateral margins behind bases of spines rather flat, only weakly converging towards promesonotal suture. Mesonotal dorsum transverse with almost vertically raised anterior corners of lateral margins; metanotal groove flat. Propodeal dorsum with lateral margins only weakly raised anteriorly, converging posteriorly and terminating in blunt tuberculae; dorsum descending into declivity in rather smooth, evenly rounded curve. Petiole scale-like, dorsal margin armed with two slender, somewhat posteriorly curved, weakly divergent, acute spines with inner margins forming 'U'-shaped petiolar dorsum; lateral margins of petiole below base of each spine with small, acute tooth. Anterior face of first gastral segment flat, with anterodorsal margin widely rounding onto dorsum.

Mandibles distinctly, longitudinally striate. Clypeus and front of head reticulate-punctate with pattern on sides and vertex somewhat longitudinally directed. Dorsum of mesosoma distinctly, mostly longitudinally reticulate-punctate; sides of mesosoma finely wrinkled; propodeal declivity and petiole, including spines, finely reticulate. Gaster finely shagreened.

Mandibular masticatory borders and outer margins with numerous, semierect, relatively long, golden hairs. Anterior clypeal margin with several long, anteriorly directed setae medially and fringe of shorter setae laterally. Numerous short to medium length, semierect hairs on clypeus, along frontal carinae and vertex; many shorter hairs fringing lateral cephalic outline in full face view. Antennal scapes with several, semierect, rather short hairs along leading edge. Dorsa of pronotum and mesonotum with very few, relatively short, semierect hairs; no hairs on propodeal dorsum and petiole. Several short, semierect hairs along ventral surfaces of femora and on tibiae. Petiole with numerous shorter hairs along lateral margins, including inner margins of spines. Gaster with numerous short or medium length, posteriorly inclined hairs, distinctly increasing in length towards gastral apex and over venter. Closely appressed, very short, silvery white or greyish pubescence variously over most body surfaces, with somewhat reddish tint on dorsum of gaster.

Colour. Black; mandibular masticatory borders lined reddish brown; antennae with funicular segments progressively lighter, yellowish brown

towards apices. Legs dark reddish brown, tarsi a shade darker. Gastral venter and apex reddish brown.

Figs 26-34. *Polyrhachis* spp. (26, 29-30) *P. planoculata* sp. n. (holotype): (26) head in full face view; (29) dorsal view; (30) lateral view. (27, 31-32) *P. procera* Emery (syntype): (27) head in full face view; (31) dorsal view; (32) lateral view. (28, 33-34) *P. pulleni* sp. n. (holotype): (28) head in full face view; (33) dorsal view; (34) lateral view. Not to scale.

Sexuals and immature stages unknown.

Etymology. Name derived from the combination of Latin words *planus*, meaning flat, and *oculus*, meaning eye, for its rather peculiar flat eyes.

Remarks. Polyrhachis planoculata is the only known species of this group with the eyes not reaching the lateral cephalic outline in full face view. The flatness of the eyes is particularly evident when the head is viewed from behind (Fig. 29).

Polyrhachis procera Emery, 1897

(Figs 27, 31-32)

Polyrhachis continua var. *procera* Emery, 1897: 581. Syntype workers, queens. Type locality: NEW GUINEA, Haveri (L. Loria), MSNG (examined).

Polyrhachis procera Emery; Kohout, 1998: 519. Raised to species.

Additional material examined. INDONESIA, WEST IRIAN: Star Mts., Bivak 36, 1220 m, 29.vii.1959 (Neth. New Guinea Exp.) (w); ditto, Sibil Valley, 05°00'S, 141°00'E, 1260 m, 2.v.1959, on light (Neth. New Guinea Exp.) (♀); PAPUA NEW GUINEA: Wau Ecology Stn., 07°20'S, 146°43'E, 27.v.-4.vi.1987 (P.J.& J.O. Schmidt) (w); Tatupiti nr Tapini, 08°21'S, 146°59'E, 1200 m, viii.1962, rf. (R.W. Taylor acc. 2293) (w).

Worker. Dimensions (syntype cited first): TL c. 12.40, 11.89-12.85 ; HL 2.90, 2.87-3.06; HW 1.93, 1.93-2.09; CI 66, 66-69; SL 4.28, 4.18-4.54; SI 222, 216-222; PW 1.86, 1.76-1.91; MTL 4.48, 4.43-4.79 (1+3 measured).

Queen. Dimensions: TL c. 12.70; HL 2.93; HW 2.18; CI 74; SL 3.93; SI 180; PW 2.62; MTL 3.88 (1 measured).

Besides characters associated with full sexuality and the shorter pronotal and petiolar spines, the single alate queen resembles the workers very closely. The pilosity is somewhat denser, notably along the leading edge of the antennal scapes and the mesosomal dorsum.

Male and immature stages unknown.

Remarks. Emery (1897: 582) separated *P. procera* from *P. continua* by its larger size and more pronounced striation of the head and thorax ('... sono più grandi e con striatura del capo e del torace più marcata'). However, direct comparison of the syntypes of both species has revealed differences in a number of other characters. In *P. procera* the clypeus in profile is gently sinuate, with the anterior margin vaguely obtuse medially (entire in modern specimens). In contrast, the clypeus in *P. continua* is almost straight in profile, with only a shallow depression anteriorly and the anterior margin is distinctly truncate medially. The pronotal spines in *P. procera* are relatively long and slender and the lateral margins of mesonotal dorsum virtually flat and converge anteriorly. In *P. continua* the pronotal spines are distinctly shorter and the lateral margins of mesonotal dorsum are raised and converge

posteriorly. Examination of the types and other available specimens clearly demonstrates *P. procera* to be a distinct species from *P. continua* and supports the earlier action of raising it to specific status (Kohout 1998).

***Polyrhachis pulleni* sp. n.**

(Figs 28, 33-34)

Types. Holotype worker: PAPUA NEW GUINEA, Milne Bay Distr., 20 km W of Rabaraba, c. 610 m, viii.1969, R.J. Pullen. *Paratype*: data as for holotype (6 workers). Holotype and 3 paratypes in ANIC; 1 paratype each in BMNH, MCZC and QMBA.

Description. Worker. Dimensions (holotype cited first): TL c. 12.40, 12.10-12.85; HL 3.06, 2.93-3.09; HW 2.21, 2.12-2.28; CI 72, 71-75; SL 4.08, 3.98-4.13; SI 185, 179-188; PW 2.12, 2.03-2.15; MTL 4.48, 4.33-4.54 (7 measured).

Anterior clypeal margin arcuate, shallowly truncate. Clypeus with poorly distinct median carina, sinuate in profile, with shallow basal margin. Frontal triangle indistinct. Frontal carinae sinuate with strongly raised margins; central area relatively narrow with weakly impressed frontal furrow. Sides of head in front of eyes almost straight before rounding into mandibular bases; behind eyes, sides produced into blunt carina extending towards occipital corners. Eyes convex; in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum with relatively long, broad-based, anterolaterally directed, acute spines; lateral edges of spines acute, terminating posteriorly in more-or-less distinct notches before merging with distinctly upturned, subparallel pronotal margins. Promesonotal suture distinctly impressed laterally, rather flat medially; mesonotal dorsum transverse with rather highly and widely raised lateral margins, weakly converging into medially flat metanotal groove. Propodeum with lateral margins raised anteriorly, flat posteriorly and terminating in blunt tuberculae; propodeal dorsum descending into declivity in weakly curved, medially uninterrupted line.

Petiole scale-like with anterior and posterior faces almost flat, strongly converging dorsally; dorsal margin armed with two slender, posteriorly curved, acute spines with inner margins forming 'U'-shaped petiolar dorsum; lateral margin of petiole below base of each spine with short, distinct, acute tooth. Anterior face of first gastral segment flat at base, narrowly rounding onto dorsum.

Mandibles finely, longitudinally striate with numerous piliferous pits towards masticatory borders. Clypeus reticulate-punctate; sculpturation obliquely striate on sides and mostly longitudinally striate on vertex and between frontal carinae and eyes. Pronotal dorsum and bases of spines finely reticulate-punctate with sculpture somewhat organised into indistinct striae towards promesonotal suture. Mesonotal and propodeal dorsa rather regularly longitudinally striate, with propodeal declivity finely reticulate-punctate. Petiole reticulate-punctate, with spines towards tips almost smooth. Gaster shagreened.

Mandibles along outer margin and towards masticatory borders with numerous suberect, relatively long, golden hairs. Anterior clypeal margin with a few, rather long setae medially and several shorter setae fringing margin laterally. Numerous, semierect or erect, medium length or relatively long hairs on clypeus and front of

head; numerous hairs fringing outline of head in full face view; antennal scapes with numerous, relatively long hairs along leading edge and somewhat fewer hairs along inferior edge. Mesosoma and legs with numerous, medium length hairs; petiole with numerous hairs around base and along lateral margins and inner margins of spines. Gaster with numerous, posteriorly directed, relatively long hairs with longer than half greatest diameter of eyes. Closely appressed, rather diluted, silvery pubescence over most body surfaces, more dense and distinctly reddish on gastral dorsum.

Colour. Black; wide band along masticatory borders and apical funicular segments reddish brown. Legs medium to dark reddish brown with trochanters and apical tarsal segments a shade lighter. Gaster very dark brown dorsally, with base, venter and apex reddish brown.

Sexuals and immature stages unknown.

Etymology. Named after the collector, R.J. Pullen, who collected many species of ants during his field work throughout Papua New Guinea.

Remarks. With its larger size (HL >2.90) and distinctly upturned pronotal and mesonotal lateral margins, *P. pulleni* somewhat resembles *P. robusta*. Both feature distinct propodeal teeth and a transverse carina dividing the propodeal dorsum from the declivity, similar to above described *P. neuguinensis*. However, in the latter species the propodeal teeth are acute and distinctly upturned and the carina completely divides the dorsum from declivity. In both the other species the carina is incomplete, with the propodeal dorsum descending into the declivity in weakly curved, medially uninterrupted line. The pronotal spines in *P. pulleni* are relatively shorter, broad-based and only about 2x as long as their basal width, while in *P. robusta* they are distinctly longer, about 3x as long as their basal width. Also, the antennal scapes in the former are generally shorter (SI 179-188 in *P. pulleni* versus 185-199 in *P. robusta*).

***Polyrhachis robusta* sp. n.**

(Figs 35, 38-39)

Types. Holotype worker: PAPUA NEW GUINEA, N. Distr. Managalase Area, 2500-3000', viii.1965, R. Pullen. *Paratypes*: data as for holotype (2 workers); Northern Prov., Owen Stanley Ra., nr Mamba Pltn, c. 7 km WNW of Kokoda, 08°51'S, 147°41'E, 500 m, 31.viii-1.ix.1984, stray on felled trees (R.J. Kohout acc. 84.403) (worker); ditto, ex rotten log (RJK acc. 84.391) (♀). Holotype worker in ANIC; 1 paratype worker and paratype queen in QMBA; 1 paratype worker each in BMNH and MCZC.

Description. Worker. Dimensions (holotype cited first): TL c. 12.90, 12.65-13.00; HL 3.12, 3.03-3.12; HW 2.28, 2.15-2.28; CI 73, 71-74; SL 4.38, 4.28-4.38; SI 192; 185-199; PW 2.15, 2.03-2.18; MTL 4.54, 4.43-4.59 (1+3 measured).

Anterior clypeal margin arcuate, shallowly truncate. Clypeus without distinct median carina, weakly sinuate in profile, with shallow basal margin. Frontal triangle distinct.

Figs 35-43. *Polyrhachis* spp. (35, 38-39) *P. robusta* sp. n. (holotype): (35) head in full face view; (38) dorsal view; (39) lateral view. (36, 40-41) *P. sericeopubescens* Donisthorpe (syntype): (36) head in full face view; (40) dorsal view; (41) lateral view. (37, 42-43) *P. simpla* Emery (syntype): (37) head in full face view; (42) dorsal view; (43) lateral view. Not to scale.

Frontal carinae sinuate with strongly raised margins; central area relatively narrow with weakly impressed frontal furrow. Sides of head in front of eyes weakly diverging anteriorly before rounding into mandibular bases; behind eyes, sides produced into

blunt carina extending towards rather prominent occipital corners. Eyes convex; in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum with long, slender, anterolaterally directed, acute spines; bases of spines somewhat dorsomedially flattened with lateral edges acute and continuous with distinctly upturned pronotal margins. Promesonotal suture distinctly impressed laterally, rather flat medially; mesonotal dorsum transverse with distinctly raised lateral margins, converging into medially flat metanotal groove. Propodeum with lateral margins raised anteriorly, flat posteriorly and terminating in distinct, short, transverse ridges; propodeal dorsum descending into declivity in weakly curved, medially uninterrupted line. Petiole scale-like with anterior face flat, posterior face weakly convex, strongly converging dorsally; dorsal margin armed with two slender, posteriorly curved, acute spines with inner margins forming widely open 'U'-shaped petiolar dorsum; lateral margin of petiole below base of each spine with short, distinct, acute tooth. Anterior face of first gastral segment flat at base, rounding anterodorsally onto dorsum.

Mandibles finely, longitudinally striate at bases; striae less regular and with numerous piliferous pits towards masticatory borders. Clypeus and vertex along occipital margin and towards occipital corners reticulate-punctate; sculpturation obliquely striate on sides and longitudinally striate from vertex towards central area and between frontal carinae and eyes. Pronotal dorsum and bases of spines finely reticulate-punctate with sculpture more regularly striate towards promesonotal suture; mesonotum rather regularly longitudinally striate, with striae continuous medially onto basal portion of propodeum; striae much finer and somewhat medially 'U'-shaped posteriorly. Propodeal declivity and petiole very finely reticulate-punctate, spines towards tips almost smooth. Gaster shagreened.

Mandibles along outer margin and towards masticatory borders with numerous erect and suberect, relatively long, golden hairs with somewhat reddish tint. A few, rather long setae arising medially from anterior clypeal margin with shorter setae fringing margin laterally. Numerous, semierect or erect, medium length or relatively long hairs of same colour rather abundant on clypeus and rest of head; numerous hairs fringing outline of head in full face view; antennal scapes with numerous, relatively long hairs along leading edge and somewhat fewer hairs along inferior edge. Mesosoma and legs with numerous, medium length hairs; petiole with several hairs around base and a few hairs along lateral margins and spines. Gaster with numerous, posteriorly directed, relatively long hairs, some as long as greatest diameter of eyes. Closely appressed, rather diluted, silvery pubescence over most body surfaces, more dense and distinctly reddish on gastral dorsum.

Colour. Black; mandibular teeth and apical funicular segments reddish brown. Legs black or very dark reddish brown with trochanters and apical tarsal segments medium reddish brown.

Queen. Dimensions: TL c. 13.51, HL 3.18; HW 2.34; CI 73; SL 4.18; SI 179; PW 2.72; MTL 4.33 (1 measured).

Queen larger than worker with usual characters identifying full sexuality, including three ocelli, complete thoracic structure and wings. Pronotal spines shorter. Mesoscutum only marginally wider than long; lateral margins strongly converging anteriorly into narrowly rounded anterior margin; median line distinct; parapsides

virtually flat; mesoscutum in profile with widely rounded anterior face and virtually flat dorsum. Mesoscutellum only weakly convex, not elevated above dorsal plane of mesosoma. Propodeum almost flat in outline, with lateral margins weakly raised anteriorly and terminating in short ridges that extend medially as a blunt, transverse border, partly dividing propodeal dorsum from declivity. Petiole with dorsal spines distinctly shorter. Sculpturation, pilosity, pubescence and colour very similar to worker.

Male and immature stages unknown.

Etymology. The name alludes to its rather robust body in comparison with the closely similar *P. continua*.

Remarks. *Polyrhachis robusta* bears a close similarity to *P. pulleni*, with differences between them discussed above under the latter species. *Polyrhachis robusta* also somewhat resembles *P. continua* with which it is sympatric at both localities it has been collected. However, they are easily separated with *P. continua* being distinctly more slender and lacking the hairs on the antennal scapes and petiolar node that are rather abundant in *P. robusta*. Also, the petiolar spines in *P. continua* are virtually parallel, while they are distinctly divergent in *P. robusta*.

Polyrhachis sericeopubescens Donisthorpe, 1941

(Figs 36, 40-41)

Polyrhachis (Myrma) sericeopubescens Donisthorpe, 1941: 61. Syntype worker, queen. Original localities: NEW GUINEA: Japen I., Mt Baduri, 1000ft, viii.1938 (for w); Mt Eiori, 2000ft, x.1938 (for ♀) (both L.E. Cheesman), BMNH (examined).

Polyrhachis sericeopubescens Donisthorpe; Kohout, 1998: 520. Senior synonym of *P. inusitata* Kohout. Erroneous synonymy.

Polyrhachis conops var. *cuspidata* Stitz, 1911: 376. Syntype workers. Type locality: NEW GUINEA (Schultze), MNHU (examined). Junior primary homonym of *Polyrhachis cuspidatus* Fr. Smith, 1857: 63. **Syn. n.**

Polyrhachis conops cuspidata Stitz; Kohout, 1998: 520.

Additional material examined. PAPUA NEW GUINEA: West Sepik Prov., Pes Mission, c. 12 km WSW of Aitape, 03°11'S, 142°15'E, <50 m, 31.vii-3.viii.1984 (RJK acc. 84.206) (w).

Dimensions of *sericeopubescens* syntypes (queen cited last): TL c. 10.73, 13.36; HL 2.62, 3.03; HW 2.00, 2.15; CI 76, 71; SL 3.68, 4.13; SI 184, 192; PW 1.75, 2.81; MTL 3.68, 4.28 (1+1 measured).

Remarks. Donisthorpe (1941), in his original description, noted that 'This distinct species in the *striata* group does not agree with any of the descriptions of other species of *Myrma* from these regions'. However, direct comparation of *P. sericeopubescens* syntype with that of *P. conops cuspidata* Stitz revealed they were virtually identical and undoubtedly conspecific. In fact, *P. sericeopubescens* is also very similar to *P. spinifera* and differs from

that species mainly by its smaller size (HL 2.63 in *sericeopubescens* versus 2.81-2.96 in *spinifera*) and in having the pronotal dorsum distinctly narrower (only 1.13x wider than long in *sericeopubescens* versus 1.5x wider than long in *spinifera*). *Polyrhachis sericeopubescens* has also been considered a senior synonym of *P. inusitata* (Kohout 1998); however, recent direct comparison of the types of both species and examination of several more recently collected specimens has confirmed they represent separate taxa (Kohout 2012).

Polyrhachis simpla Santschi, 1928

(Figs 37, 42-43)

Polyrhachis (Myrma) conops subsp. *simplex* Karavaiev, 1927: 45. Syntype workers, queens, males. Type locality: INDONESIA, Aru Is: Wammar (V. Karavaiev), IZAS, QMBA (examined). Junior primary homonym of *P. simplex* Mayr, 1862: 682.

Polyrhachis (Myrma) conops st. *simpla* Santschi, 1928: 139. Replacement name.

Polyrhachis simpla Santschi; Kohout, 1998: 520. Raised to species.

Additional material examined. PAPUA NEW GUINEA: West Sepik Prov., Pes Mission, c. 12 km WSW of Aitape, 03°11'S, 142°15'E, c. 50 m, 3.viii.1984, swampy lowland rf., ex nest in tree trunk crevice (RJK accs 84.184, 214) (w).

Dimensions of *conops simpla* syntypes: TL c. 9.78-11.54; HL 2.59-2.77; HW 1.87-2.02; CI 71- 73; SL 3.63-3.88; SI 192-196; PW 1.96-2.17; MTL 3.83-4.03 (4 measured).

Sexuals apparently present in Karavaiev collection in Kiev, Ukraine (IZAS).

Remarks. *Polyrhachis simpla* is very similar to *P. spinifera* and *P. sericeopubescens*, however, it differs from both in having the lateral margins of the pronotal dorsum virtually flat, while they are distinctly upturned in the other species. Also, the lateral margins of mesonotum distinctly converge posteriorly in *P. simpla,* while they are subparallel in both *P. spinifera* and *P. sericeopubescens*.

Polyrhachis spinifera Stitz, 1911

(Figs 44-45, 47-48)

Polyrhachis conops var. *spinifera* Stitz, 1911: 376. Syntype workers. Type locality: NEW GUINEA, Tana (Moszkowski), MNHU, MHNG (examined).

Polyrhachis continua var. *hirsutula* Emery, 1911: 256. Syntype workers. Type locality: NEW GUINEA, R. Digul (Digool on locality label) (= Digoel River), MSNG (examined). Synonymy by Kohout, 1998: 520.

Polyrhachis spinifera Stitz; Kohout, 1998: 520. Raised to species.

Additional material examined. PAPUA NEW GUINEA: Murua Riv. nr Kerema, 07°50'S, 145°52'E, 10 m, 20.xii.1964 (Malaise trap) (J. Sedláček) (w); West Sepik Prov., Pes Mission, c. 12 km WSW of Aitape, 03°11'S, 142°15'E, <50m, 31.vii-3.viii.1984, ex nest in dry bamboo internode (RJK acc. 84.184, w, ♀); ditto, strays on

foliage and vegetation (RJK acc. 84.206) (w, ♀); ditto, ex nest in rotting tree branch on ground (RJK acc. 84.208) (w, ♀); Central Prov.: 5 km NW of Brown Riv. For. Stn, 09°10'S, 147°12'E, <50 m, 6.ix.1984, ex nest in rotting log (RJK acc. 84.442) (w, ♀); Astrolabe Ra., Musgrove Riv. Valley, c. 350m, vi.1962, rf. (R.W. Taylor acc. 1844) (w).

Figs 44-50. *Polyrhachis* spp. (44-45, 47-48): *P. spinifera* Stitz (syntype); (44) head in full face view; (45) petiole in frontal view; (47) dorsal view; (48) lateral view. (46, 49-50) *P. tapini* sp. n. (holotype); (46) head in full face view; (49) dorsal view; (50) lateral view. Not to scale.

Worker. Dimensions of *conops spinifera* and *continua hirsutula* syntypes: TL c. 11.44-12.20; HL 2.81-2.96; HW 2.04-2.15; CI 72-75; SL 3.88-3.96; SI 183-194; PW 1.96-2.31; MTL 3.93-4.03 (3 measured).

Queen (not previously described). Dimensions: TL c. 12.50-12.60; HL 2.84-2.93; HW 2.06-2.15; CI 72-73; SL 3.78-3.83; SI 178-183; PW 2.53-2.62; MTL 3.68-3.83 (2 measured).

Larger than worker with usual characters identifying full sexuality, including three ocelli, complete thoracic structure and wings. Pronotal spines shorter. Mesoscutum only marginally wider than long; lateral margins strongly converging anteriorly into narrowly rounded anterior margin; median line distinct; parapsides virtually flat, only weakly raised posteriorly; mesoscutum in profile with widely rounded anterior face and weakly convex, posteriorly almost flat, dorsum. Mesoscutellum only weakly convex, marginally elevated above dorsal plane of mesosoma. Propodeum with lateral margins distinctly rounded anteriorly and weakly raised towards middle of their length; margins terminating posteriorly in short ridges that extend medially for a short distance with dorsum between them descending into declivity in medially uninterrupted line. Petiole with dorsal spines distinctly shorter. Sculpturation, pilosity, pubescence and colour scheme virtually identical to worker.

Male and immature stages unknown.

Remarks. As mentioned earlier (Kohout 1998: 520), direct comparison of the syntypes of *P. conops spinifera* and *P. continua hirsutula* has shown them to be very similar and undoubtedly representing a single species. They differ from *P. conops* and *P. continua* by a distinctly wider pronotal dorsum and rather abundant semierect to erect pilosity which is almost completely lacking in the other two species. *Polyrhachis conops spinifera* and *P. continua hirsutula* were described in the same year, however, Stitz's description of *spinifera* was published on 30.x.1911, while Emery's *hirsutula* appeared two months later on 31.xii.1911 (Bolton 1995).

***Polyrhachis tapini* sp. n.**

(Figs 46, 49-50)

Types. Holotype worker: PAPUA NEW GUINEA, Central Distr., Tapini, 1000-1200 m, rf., viii.1962, ex nest in soil, R.W. Taylor acc. 2200. *Paratypes*: data as for holotype (2 workers, 2 queens); NEW GUINEA, Morobe Distr., Herzog Mts., Wagau. C. 4,000 ft, 4-17.i.1965; M.E. Bacchus, B.M. 1965-120; Stn. No. 137. Holotype, 1 paratype worker and 1 paratype queen in ANIC; 1 paratype worker and paratype queen in QMBA; 1 paratype worker in BMNH.

Description. Worker. Dimensions (holotype cited first): TL c. 11.39, 11.24-11.89; HL 2.81, 2.81-2.90; HW 2.06, 1.96-2.15; CI 73, 70-74; SL 4.03, 3.93-4.08; SI 196, 190-200; PW 1.90, 1.87-1.93; MTL 4.13, 4.03-4.33 (4 measured).

Anterior clypeal margin arcuate, medially truncate. Clypeus without distinct median carina, very weakly sinuate in profile, with almost flat basal margin. Frontal triangle distinct. Frontal carinae sinuate with strongly raised margins; central area relatively narrow with weakly impressed frontal furrow. Sides of head in front of eyes subparallel, before rounding into mandibular bases; behind eyes sides with distinct postocular carina extending towards occipital corners. Eyes convex; in full face view clearly exceeding lateral cephalic outline. Ocelli lacking. Pronotal dorsum with relatively long, slender, anterolaterally directed, acute spines; lateral edges of spines acute, merging posteriorly with narrowly upturned, smoothly rounded pronotal margins. Promesonotal suture distinctly impressed laterally, rather flat medially;

mesonotal dorsum transverse with weakly sinuate, anteriorly raised lateral margins, posteriorly rounding into medially flat metanotal groove. Propodeum with lateral margins only weakly raised anteriorly, flat for most of their length and terminating in poorly raised, blunt tuberculae; propodeal dorsum descending into declivity in weakly curved, medially uninterrupted line. Petiole scale-like, distinctly slender in lateral view, armed with two rather long and slender, posteriorly curved, acute spines with inner margins forming 'U'-shaped petiolar dorsum; lateral margin of petiole below base of each spine with very short, acute tooth. Anterior face of first gastral segment flat at base, widely rounding onto dorsum.

Mandibles finely, longitudinally striate with numerous piliferous pits towards masticatory borders. Clypeus reticulate-punctate; sculpturation obliquely striate on sides and mostly longitudinally striate on vertex and between frontal carinae and eyes. Pronotal dorsum finely, longitudinally striate at base, with striae diverging anteriorly towards bases of spines. Mesonotal and propodeal dorsa finely, rather regularly, longitudinally striate, with propodeal declivity finely reticulate-punctate. Petiole reticulate-punctate, with spines towards tips almost smooth. Gaster shagreened.

Mandibles along outer margin and towards masticatory borders with numerous suberect, relatively long, golden hairs. Anterior clypeal margin with a few, rather long setae medially and several shorter setae fringing margin laterally. Numerous, semierect or erect, relatively long hairs rather abundant on clypeus and front of head; numerous somewhat shorter hairs fringing outline of head in full face view; antennal scapes with numerous, relatively long hairs along leading edge; hairs lacking on dorsum of mesosoma and petiole. Legs, including coxae, with numerous, medium length hairs along ventral margin. Gaster with numerous, medium length, posteriorly directed hairs. Closely appressed, relatively sparse, silvery pubescence over most body surfaces, except dorsum of mesosoma and petiole; pubescence denser with distinct reddish tint on gastral dorsum.

Colour. Black; wide band along masticatory borders and apical funicular segments reddish brown. Legs medium to dark reddish brown with trochanters and apical tarsal segments a shade lighter. Gaster black or very dark brown dorsally, apex reddish brown.

Queen. Dimensions: TL c. 12.10-13.15; HL 2.93-2.99; HW 2.18; CI 73-74; SL 4.08-4.13; SI 187-189; PW 2.46-2.59; MTL 4.03-4.08 (2 measured).

Queen marginally larger than worker with usual characters identifying full sexuality, including three ocelli, complete thoracic structure and wings. Pronotal spines shorter. Mesoscutum only marginally wider than long; lateral margins converging into moderately rounded anterior margin; median line distinct; parapsides virtually flat; mesoscutum in profile with widely rounded anterior face and virtually flat dorsum. Mesoscutellum weakly convex, marginally elevated above dorsal plane of mesosoma. Propodeum with lateral margins weakly raised anteriorly, terminating posteriorly in short ridges; propodeal dorsum in lateral view descending into declivity in medially unbroken curve. Petiole with dorsal spines distinctly shorter. Sculpturation on mesoscutum with longitudinal striae curving anteriorly and medially towards median line, with those on mesoscutellum weakly diverging posteriorly. Pilosity and pubescence similar to that in worker, except numerous erect, medium length hairs

present on dorsum of mesosoma that are completely absent in worker. Colour scheme very similar to worker.

Male. A single callow male present in the ANIC spirit collection (Bottle no. 39/4).

Immature stages unknown.

Etymology. Named after the type locality, Tapini village, nestled along the southern slopes of the Owen Stanley Range in Papua.

Remarks. Polyrhachis tapini is a very characteristic and easily recognisable species. It features virtually flat pronotal and mesonotal dorsa with lateral margins that are rather abruptly and very narrowly (only about 0.1 mm) upturned. The pronotal spines are long and slender with their tips weakly downturned. The petiole has long and divergent dorsal spines and lateral spines reduced to mere angles. The dorsa of the mesosoma and petiole are completely hairless and with only very sparsely distributed, appressed pubescence.

Concluding note

This paper is part of a wider study of the systematics and biology of *Polyrhachis* ants. For a review of their nesting habits and socioecology see Robson and Kohout (2007).

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POLYRHACHIS (MYRMOTHRINAX) NEPENTHICOLA, A NEW SPECIES OF THE *THRINAX*-GROUP INHABITING PITCHER PLANTS (HYMENOPTERA: FORMICIDAE: FORMICINAE)

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Abstract

Polyrhachis (Myrmothrinax) nepenthicola, a new species of the *thrinax* species-group, is described from Sarawak, Borneo. The characters distinguishing it from similar species of the *thrinax*-group are provided and the species is illustrated. A preliminary note on its unusual nesting habit is included.

Introduction

The subgenus *Myrmothrinax* was established by Forel (1915) as a subgenus of *Polyrhachis* Fr. Smith, 1857, with *Polyrhachis thrinax* Roger, 1863 as the type species. The first description was given by Emery (1925), who included 27 species and subspecific forms as its constituents. Both Emery (1925) and, more recently, Dorow (1995) considered *Myrmothrinax* to be a relatively small and homogenous group and did not subdivide it into species-groups. However, as discovery of numerous new, mainly Southeast Asian species is increasing, Kohout (2008) proposed two species-groups, based on the relative length of the petiolar spines.

The *aequalis*-group includes species with the petiolar spines more-or-less subequal or with the middle spine shorter than the lateral pair. The *thrinax*-group includes species with the middle petiolar spine distinctly elongated. Distribution of the subgenus *Myrmothrinax* extends from India, Sri Lanka and Myanmar across Southeast Asia to the Philippines and Vietnam, and southwards throughout Indonesia to Papua New Guinea, Solomon Islands and northern Australia. The *Myrmothrinax* species are typical arboreal nesters, with their nesting habit almost identical to the closely similar species of the subgenus *Myrmatopa* Forel. They build their polydomous nests of silk and vegetation debris between the leaves of trees and shrubs (Robson and Kohout 2005, 2007) and in some localities ants of both subgenera were found nesting together side by side (Kohout 1999). However, as the employment of modern collecting methods, such as insecticidal fogging, has resulted in the discovery of many new species, it also became apparent that, while the *Myrmatopa* species seemingly prefer the rainforest canopy for their nesting sites, the *Myrmothrinax* species are predominantly confined to the lower arboreal zone.

While ant association with various plants is widely known, their interaction with pitcher plants (Nepenthaceae) has been recorded on only a few occasions. Many species of ants visit pitcher plants regularly to feed on the extrafloral nectar; however, they also risk being digested in the pitfall traps.

Only one species of ant, *Camponotus (Colobopsis) schmitzi* Stärcke, is so far known to find a shelter and nesting space within the swollen and hollow tendrils of *Nephentes bicalcarata* (Clarke and Kitching 1995, Thornham *et al.* 2012). At the same time, these ants are able not only to move across the slippery surface of the pitcher without being trapped, but also to swim in the pitcher fluid, where they hunt and retrieve food from the pitcher (Clarke and Kitching 1995). However, the nesting behaviour of *Polyrhachis nepenthicola* sp. n., described below, is the only recorded case of an ant actually building its nest within a pitcher of a *Nepenthes* plant (Grafe and Kohout in press).

Methods and abbreviations

Photographs of the ant specimens were taken with a digital camera attached to a stereomicroscope and processed using Auto-Montage (Syncroscopy, Division of Synoptics Ltd, USA) and Adobe Photoshop CS2 (Adobe Systems Inc., USA). Images depicting the holotype were photographed by Dr Steve O. Shattuck (ANIC). Photographs of living specimens, including their nest and the pitcher plant *Nepenthes stenophylla* in their natural environment, were taken by Dr T. Ulmar Grafe (UBDG).

Standard measurements and indices follow Kohout (2008): TL = Total length (the necessarily composite measurement of the outstretched length of the entire ant measured in profile); HL = Head length (the maximum measurable length of the head in perfect full face view, measured from the anterior-most point of the clypeal border or teeth to the posterior-most point of the occipital margin); HW = Head width (width of the head in perfect full face view, measured immediately in front of the eyes); CI = Cephalic index (HW x 100/HL); SL = Scape length (length of the antennal scape, excluding the condyle); SI = Scape index (SL x 100/HW); PW = Pronotal width (greatest width of the pronotal dorsum, measured behind the pronotal teeth); MTL = Metathoracic tibial length (maximum measurable length of the tibia of the hind leg). All measurements are in millimetres (mm) and were taken using a Zeiss (Oberkochen) SR stereomicroscope at 20x and 32x magnifications with an eyepiece graticule calibrated against a stage micrometer.

Institutions (with names of cooperating curators): ANIC – Australian National Insect Collection, CSIRO Entomology, Canberra, ACT, Australia (Dr S.O. Shattuck); BMNH – The Natural History Museum, London, UK (S. Ryder); MCZC – Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA (Dr S.P. Cover); SMKS – Sarawak Museum, Kuching, Sarawak; QMBA – Queensland Museum, Brisbane, QLD, Australia (Dr C.J. Burwell); UBDG – University Brunei Darussalam, Gadong.

Systematics

Genus *Polyrhachis* Fr. Smith, 1857

Polyrhachis Fr. Smith, 1857: 58. Type species: *Formica bihamata* Drury, 1773, by original designation.

Subgenus *Myrmothrinax* Forel, 1915

Myrmothrinax Forel, 1915: 107 (as subgenus of *Polyrhachis* Fr. Smith). Type species: *Polyrhachis thrinax* Roger, 1863, by original designation.

Myrmothrinax Forel; Emery, 1925: 182 (diagnosis of the subgenus).

Polyrhachis nepenthicola sp. n.

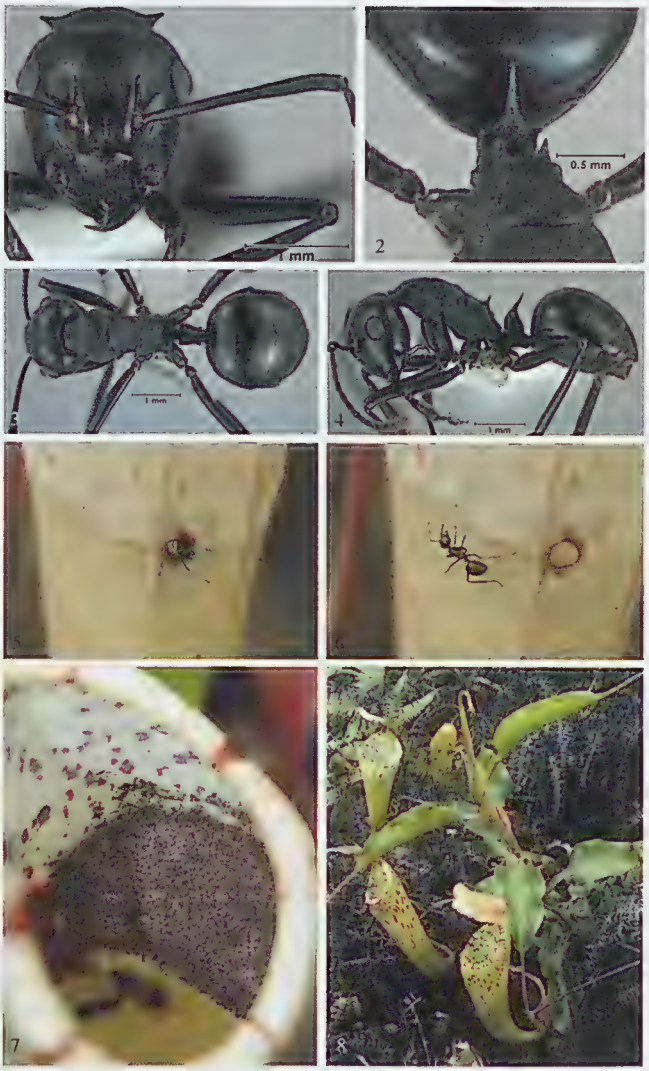
(Figs 1-8)

Types. Holotype worker: BORNEO, SARAWAK, Lawas, Paya Maga, 04°27'N, 115°33'E, 1810 m, 11.x.2010, T.U. Grafe (worker). *Paratypes*: data as for holotype, 20 workers, 1 queen, 8 males. Type distribution: Holotype, most paratype workers, paratype queen and paratype males in QMBA; 2 paratypes each in ANIC, BMNH, MCZC, SMKS, UBDG.

Description. Worker. Dimensions (holotype cited first): TL c. 7.26, 6.85-8.47; HL 1.78, 1.65-1.93; HW 1.59, 1.53-1.81; CI 89, 87-94; SL 2.07, 1.93-2.18; SI 130, 120-135; PW 1.00, 0.94-1.15; MTL 2.50, 2.37-2.65 (1+12 measured).

Mandibles with 5 teeth. Anterior clypeal margin widely medially truncate with truncate portion shallowly emarginate and flanked by blunt angles. Clypeus with posteriorly raised median carina; straight in profile, posteriorly rounding into moderately impressed basal margin. Frontal triangle distinct. Frontal carinae sinuate with margins only weakly raised at midlength; central area relatively wide with distinct frontal furrow. Sides of head in front of eyes converging towards mandibular bases in weakly convex line; behind eyes sides widely rounding into convex occipital margin. Eyes convex, in full face view clearly breaking lateral cephalic outline. Ocelli lacking in holotype; median ocellus indicated by shallow pit in some paratypes. Pronotal humeri armed with bluntly terminated, laterally directed, spines, about as long as their basal width; lateral pronotal margins rather blunt, becoming indistinct before reaching promesonotal suture. Mesonotum with lateral margins rounded anteriorly, somewhat raised and subparallel posteriorly towards distinct metanotal groove. Propodeal dorsum only marginally longer than wide, with rather blunt, subparallel, lateral margins, terminating posteriorly in vertically elevated spines; propodeal declivity oblique, laterally expending towards very conspicuous, rather large, propodeal spiracles. Petiole armed with two short, tooth-like, lateral spines and long, acute, dorsoposteriorly elevated median spine, weakly bent upwards from its midlength. Anterior face of first gastral segment distinctly higher than full hight of petiole, widely rounding onto gastral dorsum.

Mandibles very finely longitudinally striate with numerous piliferous pits; sculpture distinctly finer towards masticatory borders. Clypeus very finely reticulate-punctate with rest of head shagreened. Mesosoma and petiole, including spines, distinctly reticulate-punctate, opaque. Gaster very finely shagreened, polished.



Figs 1-8. *Polyrhachis (Myrmothrinax) nepenthicola* sp. n. (1) head in full face view; (2) petiole in frontal view; (3) dorsal view; (4) lateral view; (5) ant exiting pitcher through a small hole and (6) foraging at the border between the waxy and secretory zones of the pitcher; (7) nest inside the pitcher; (8) *Nepenthes stenophylla* at the study site in northern Sarawak. Photographs 5-8 courtesy of T. Ulmar Grafe.

Mandibular masticatory borders with numerous, semierect, golden hairs. Clypeus with only few short golden setae along anterior margin and single, medium length hair laterally. A few long, erect hairs on frontal coxae; numerous long hairs lining margins of segments on gastral venter and around apex. Closely appressed golden pubescence rather diluted on head and gaster; it is almost completely absent from mesosoma and petiole.

Black or dark reddish-brown, with head, gaster and appendages a shade lighter; funicular and tarsal segments progressively lighter towards apexes. Mandibles along masticatory borders with narrow, light reddish-brown band.

Queen. Dimensions: TL c. 10.23; HL 2.25; HW 2.03; CI 90; SL 2.59; SI 127; PW 1.65; MTL 3.18 (1 measured). Very similar to worker with usual differences indicating caste, including three ocelli and complete thoracic structure. Pronotal humeri produced into blunt, tooth-like spines; their outer margins merging into rather blunt and short pronotal margins. Mesoscutum virtually as wide as long, with lateral margins converging anteriorly and forming moderately rounded anterior margin; median line only shallowly impressed; parapsides weakly raised along their entire length. Mesoscutum in profile with anterior margin rounded onto virtually flat dorsum. Mesoscutellum convex, distinctly raised above dorsal plane of mesosoma. Propodeal dorsum with lateral margins indistinct; propodeal spines shorter, somewhat anteroposteriorly flattened. Propodeal spiracles similar, but larger, than in worker. Petiole with lateral spines distinctly longer than in worker, almost 2x as long as wide at base; median petiolar spine shorter than in worker, with apex bluntly rounded. Head, mesosoma and petiole finely reticulate-punctate, with anterior margin of mesoscutum medially smooth and polished; gaster shagreened. Pubescence and colour virtually as in worker.

Males in QMBA spirit collection.

Etymology. The specific name is derived from a combination of the generic name of the host pitcher plant, *Nepenthes stenophyla*, and the Latin suffix -*cola*, meaning inhabitant.

Remarks. Polyrhachis nepenthicola stands closest to *P. triaena* Wheeler and also described from Sarawak (Wheeler 1919), with both species sharing a similar size (HL 1.65-1.93 in *P. nepenthicola* versus HL 1.68-1.78 in *P. triaena*). However, both species differ in a number of other characters, with *P. nepenthicola* featuring a distinctly wider head (CI 89-94), shorter antennal scapes (SI 120-128), almost quadrate propodeal dorsum and the conspicuously large propodeal spiracles. In contrast, the head in *P. triaena* is narrower (CI 82-85), antennal scapes longer (SI 157-159), propodeal dorsum almost 2x as long as wide and the propodeal spiracles relatively flat.

The nest of *Polyrhachis nepenthicola* was collected from the pitcher of *Nepenthes stenophylla* (Fig. 8) growing alongside the road in secondary vegetation of the sub-montane, mixed dipterocarp forest.

For detailed aspects of its biology (Figs 5-7) see Grafe and Kohout (in press).

Acknowledgements

I am very grateful to Assoc. Prof. Dr T. Ulmar Grafe, Department of Biology, University Brunei Darussalam, for supplying the specimens of this new species and for the information, including photographs, relating to its unique nesting habit. I am much indebted to Dr Steve O. Shattuck (ANIC) for his patience and care in preparation of the digital images used for the illustrations. Finally, my sincere thanks go to Dr Geoff B. Monteith (QMBA) for reading and commenting on a draft of the manuscript.

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THRIOCERODES ANTHICIDES (NEWMAN), COMB. N. (COLEOPTERA: CLERIDAE): AN AUSTRALIAN, NOT SOUTH AFRICAN, SPECIES

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Abstract

Corynetes compactus Westwood is recognised as a junior synonym (syn. n.) of *Pylus anthicides* Newman, which is transferred from the South African genus *Thriocera* Gorham to the endemic Australian genus *Thriocerodes* Wolcott & Dybas, resulting in the combination *Thriocerodes anthicides* (Newman), comb. n.

Introduction

For the past 135 years, the clerid beetle *Pylus anthicides* Newman has been regarded as a South African species, with the original Australian type locality considered an error. This is now known not to be the case.

Primary type specimens of *Pylus anthicides* Newman (Fig. 1) and *Corynetes compactus* Westwood (Fig. 2), respectively held at the Natural History Museum, London (BMNH) and the Oxford University Museum of Natural History (OUMNH), plus reliably identified specimens of *Globoclava quadrimaculata* (Chevrolat) (from BMNH: Fig. 3), were morphologically examined using a Nikon SMZ-1500 stereo dissecting microscope.

Figs 1-3. (1) primary type of *Pylus anthicides* Newman from BMNH; (2) primary type of *Corynetes compactus* Westwood from OUMNH; (3) *Globoclava quadrimaculata* (Chevrolat), BMNH specimen from Malvern, South Africa.

Taxonomy

Newman (1842) described *Pylus anthicides* Newman from Port Phillip, Victoria (then part of New South Wales). Lacordaire's (1857) unjustified (see Article 32.5.1 of ICZN 1999) emendation of the spelling of Newman's species to '*anthicoides*' was followed by Gemminger and Harold (1869), Gorham (1878), Blackburn (1900), Lohde (1900) and Schenkling (1903, 1910). Gorham (1878), expressing doubt over the validity of the Australian type locality of Newman's species, transferred *Pylus* '*anthicoides*' to his new genus *Thriocera* Gorham, while synonymising with it *Pilus quadrimaculata* Chevrolat from South Africa. Schenkling (1903), in his treatment of world clerid genera, followed Gorham, though with apparent reservation. Corporaal's (1950) catalogue (using the correct spelling '*anthicides*') reflected Gorham's doubt of the Australian type locality. More recently, Opitz (2012) returned *Pilus quadrimaculata* to full species status (designating it the type species of *Globoclava* Opitz), without commenting on the status of *Thriocera anthicides*.

Examination of the primary type specimen of *P. anthicides* (in BMNH) confirmed Opitz's removal of *P. quadrimaculata* from synonymy and revealed that Newman's species belongs to the endemic Australian tarsostenine genus *Thriocerodes* Wolcott & Dybas, which can be defined by the following character states: eyes well separated and coarsely facetted; terminal palpomeres securiform; procoxal cavities posteriorly open; elytra compact, punctation lacking internal nodules; tibial spur formula 1-2-1, tarsal pulvillar formula 3-3-3. Additionally, the type specimen of *Corynetes compactus* Westwood, 1853 (in OUMNH) was studied and found to be a junior synonym (**syn. n.**) of *Thriocerodes anthicides* (Newman, 1842), **comb. n.**

Thriocerodes anthicides is, so far, known only from the type locality of Port Phillip (Melbourne), Victoria, plus recently identified material from South Australia (SA: 35.608°S 138.261°E, Deep Creek NP, Boat Harbour turnoff, 12 Mar. 2011,Monteith and Turco. Barkspray on eucalypts. 18819. Australian National Insect Collection, Canberra) and New South Wales (NSW:31.737°S, 149.993°E, Coolah Tops NP, 8Feb. 2010.Monteith and Turco. Barkspray on eucalypts, 19553, Queensland Museum, Brisbane). Both recent specimens were collected by pyrethrum spraying of trunks of living eucalypts. The specimen from Deep Creek National Park (Voucher No: COL1686) has been submitted to a molecular phylogeny of Cleridae project being undertaken by the author and collaborators in Australia and the United States.

Correction to Opitz (2012)

The draft manuscript of Opitz's (2012) review of tarsostenine genera was

submitted for peer review prior to the recognition that *Pilus quadrimaculata* Chevrolat was not a synonym of *Pylus anthicides* Newman. Several substitutions of the word '*anthicides*' for '*quadrimaculata*' were made throughout the manuscript but the following was not amended prior to publication: page 11, first line beneath the Figure 3 caption – '*Globoclava anthicides* (Newman) (new combination)', should read '*Globoclava quadrimaculata* (Chevrolat) (new combination)'.

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I wish to thank Geoff Monteith and Federica Turco (Queensland Museum) for passing on to me the specimens from Deep Creek and Coolah Tops National Parks.

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CORRIGENDA

Australian Entomologist, 2012, **39** (3): 161-177.

A REVIEW OF THE NEW GUINEAN GENUS *PARAMECOCNEMIS* LIEFTINCK (ODONATA: PLATYCNEMIDIDAE), WITH THE DESCRIPTION OF THREE NEW SPECIES

A.G. ORR, V.J. KALKMAN and S.J. RICHARDS

In the above recently published article two spelling errors of species group names are noted and amended:

Paramecocnemis stillacruoris Lieftinck, 1956 (not *stillacruroris*). Note this species was originally described as *stilla-cruoris* and has been amended under requirements of the ICZN.

Paramecocnemis spinosa Orr, Kalkman & Richards, 2012 (under the gender agreement requirement the adjective *spinosus* must take the feminine form. Cnemis, and its compounds, are derived from the Greek noun κνημη, meaning tibia, which is feminine).

Acknowledgement
We are grateful to Dr Jan van Tol, president of the ICZN, for drawing our attention to these lapses.

Australian Entomologist, 2012, **39** (3): 195-196.

A NOTE ON THE IDENTITY OF *'ACANTHONEVRA' INERMIS* HERING (DIPTERA: TEPHRITIDAE: ACANTHONEVRINI)

DAVID L. HANCOCK

In the above article the generic name *Lumirioxa* was used in error for *Lenitovena*. The correct combinations for the two species affected are *Lenitovena affluens* (Hering) and *Lenitovena ornatipennis* (Hering).

Australian Entomologist, 2012, **39** (4): 281-292.

REVIEW OF AUSTRALIAN *PHYLLODES IMPERIALIS* DRUCE (LEPIDOPTERA: EREBIDAE) WITH DESCRIPTION OF A NEW SUBSPECIES FROM SUBTROPICAL AUSTRALIA

D.P.A. SANDS

In the above article a duplication of Figure 4 (underside of *P. i. meyricki*) was inadvertently used in error for Figure 6 (*P. i. imperialis*).

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